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PREFACE

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CHAPTER 1

Methods of Instruction for the Gun Platoon

(75-mm RECOILLESS RIFLE)

1. PURPOSE. The purpose of this article is to present uniform methods of training for the gun platoon. The article is divided into three sections: Section I, Methods of Instruction for Mechanical Training (for technical data, refer to Chapter 2, Volume XXIX, THE MAILING LIST.); Section II, Crew Drill and Methods of Instruction in Crew Drill; Section III, Marksmanship, and Methods of Instruction in Marksmanship. Courses of instruction, rules, and regulations for the conduct of instruction practice are included.

2. SCHEDULES. *a.* For convenience in preparation of schedules, a suggested allotment of time is given below. It is felt that a minimum of 80 hours is required to impart a basic knowledge of the capabilities and limitations of the weapon and to provide an opportunity to qualify as an expert, first class, or second class gunner.

b. The sequence of instruction, with the allotment of hours to each phase, is: mechanical training, 16 hours; technique of fire, preliminary marksmanship, 24 hours; technique of fire, marksmanship, 30 hours; technique of fire, indirect fire, 10 hours. Tactical training is not included in this time. Transition and field firing should follow in order.

SECTION I

METHODS OF INSTRUCTION FOR MECHANICAL TRAINING

3. SCHEDULE FOR MECHANICAL TRAINING. *a.* With a time allotment of 16 hours for mechanical training, experience has shown that a feasible distribution of time and sequence of instruction is as follows:

	Hours
(1) General data, nomenclature, disassembly and assembly	5
(2) Functioning	4
(3) Stoppages and immediate action	2
(4) Characteristics of ammunition and fuzes	1
(5) Care and cleaning (initial conference only)	1
(6) Fire control instruments	2
(7) Mountings, spare parts and accessories	1
Total	16

b. The allotment of time given above is not mandatory, but is presented as a guide only. The availability of time and facilities may dictate adjustment of this program.

c. Information on mechanical training and boresighting has been provided in Chapter 2, Volume XXIX, THE MAILING LIST.

4. METHODS OF INSTRUCTION. *a. General.* Much has been said about methods of training for all types of weapons. The methods used have very much in common. In the paragraphs to follow, a discussion is given of the application of standard methods to 75-mm recoilless rifles.

b. Decentralization. The normal decentralization of instruction is applied with groups of not more than five per weapon. Since this is half the size of the squad, it also forms a basis of teamwork throughout the instruction phase.

c. Instructor. Success of the program depends on the ability of the instructor. Properly led, the individuals will learn quickly and intelligently. If taught in a haphazard manner, the results will be of the same type.

d. Knowledge of men. The instructor should have an intimate knowledge of the students. Their level of intelligence, rate of assimilation, previous experience with other type weapons, and level of education are important factors to be considered.

e. Preparation. Time limitations and the rapidity with which men can assimilate and retain new material determines the amount of material to be presented during each phase of mechanical training. Where time is short, mechanical training may be conducted concurrently with marksmanship or other training.

f. Assistant instructors. Assistant instructors must be selected and trained in advance. They should be the best men available, preferably noncommissioned officers. There should be a sufficient number to have one per group with additional ones to assist in overall supervision and to replace those lost through attrition.

g. Training aids. Training aids considered essential for mechanical training are shown in figure 1. Available training films should be used but must be checked to detect errors resulting from new developments.

h. Application. Emphasis should be placed on the application phase of mechanical training. Men learn best by handling the weapon, by seeing it, as well as hearing about it. Control as to speed of learning is essential only to insure that the *slowest* man is attaining the required standard.

5. NOMENCLATURE, DISASSEMBLY, AND ASSEMBLY. For best results in teaching nomenclature, disassembly and assembly, each individual is required to disassemble and assemble the rifle, naming the parts to the assistant instructor as he works. The use of a training aid, similar to that shown in figure 1 (nomenclature chart) accelerates the rate of learning.

During disassembly each part is placed by its name on the nomenclature chart in order to facilitate association of name and part. The instruction should be controlled to provide continuity and progress. Too long a period on disassembly and assembly results in a lack of interest. Short periods of not more than two hours duration will hold the interest up to the maximum.

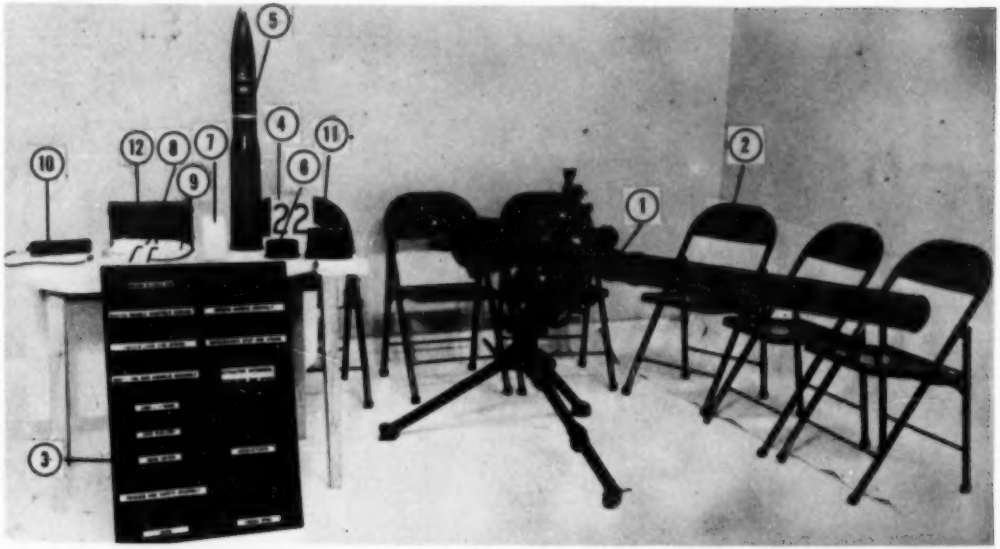


FIGURE 1.—Recommended set up for conducting firing instruction in mechanical training, includes:

(1) Rifle, mounted on tripod, including sights.
(2) Chairs for groups and assistant instructor.
(3) Nomenclature board.
(4) Group number.
(5) Dummy ammunition round.
(6) Boresight disc.
(7) Individual sight reticles.
(8) Allen wrenches.
(9) Waste.
(10) Instrument light, M-36.
(11) Red band to designate assistant instructor.
(12) Carrying case M-78 (for sight M-34)

6. FUNCTIONING. Disassembly and assembly is followed by functioning. Figure 19, Volume XXIX, THE MAILING LIST, illustrates a cross section of the breechblock; a working model of the mechanism may be used to facilitate the explanation of functioning. In addition, each group can use the gun parts to determine the functioning. Trigger and safety charts and firing-linkage charts may be prepared to better illustrate the functioning of smaller parts. The time allotted to functioning should be approximately equal to that devoted to assembly and disassembly. The usual instructional methods (explanation, demonstration, application, examination, and discussion) should be applied to determine the proficiency of each individual in functioning. When the desired standard has been attained by the majority of the group they should be permitted to proceed. Additional instruction must be arranged for those who have not attained the desired standard. *A knowledge of functioning is essential to the prevention and reduction of stoppages.*

7. STOPPAGES AND IMMEDIATE ACTION. The prevention and prompt reduction of stoppages is necessary to keep the gun in action. In this phase of instruction, the ingenuity of the instructor should be used to the maximum. Every type of stoppage should be set up and the student required to reduce it promptly or to explain the actions to be taken. Practical work is mandatory. Instruction should be devoted to immediate action until it becomes "the unhesitating action, promptly applied, which will reduce the most frequent stoppage without hesitating to analyze the cause."

8. AMMUNITION AND FUZES. On completion of stoppages and immediate action, the soldier should become familiar with the characteristics and uses of ammunition and fuzes. An explanation of these characteristics is aided by dummy ammunition displays with packing cases and charts. (See figures 20, 21, 22 and 23, Volume XXIX, THE MAILING LIST.) To demonstrate the use of various types of ammunition and fuzes, a description followed by a firing demonstration of each type makes a lasting impression.

9. CARE AND CLEANING. Throughout the training, periods of care and cleaning should be included. The first period should include a conference on cleaning materials and their use, followed by practical work in cleaning of the weapons. Additional periods should be scheduled daily to keep the weapons in proper condition.

10. MOUNTINGS. The flexibility of mountings for the 75-mm recoilless rifle can be illustrated by demonstration; each group should mount and fire the weapon from each type mount. The light machine gun tripod (figure 24, Volume XXIX, THE MAILING LIST) offers great advantages, which number 1 will realize quickly, on a cross country movement. Firing from a dash mount or pedestal mount on a ¼-ton truck quickly demonstrates the advantages and disadvantages of a vehicular mount not to be gained in any other way. (Figure 25, Volume XXIX, THE MAILING LIST.)

11. FIRE CONTROL INSTRUMENTS. *a. Direct Fire Sight M85-C.* Since the weapon is capable of delivering both direct and indirect fire, attention should first be directed to the primary fire control instrument, the direct fire sight M85-C. An enlarged acetate model of the sight reticle will simplify instruction in the characteristics of the sight (see figure 2). A small tank silhouette superimposed on the sight reticle facilitates setting the sight picture. (Small individual reticles can be made for use by each individual and exercises conducted to determine individual proficiency in the use of the sight. This exercise is also appropriate for later training in marksmanship. The main objective at this stage of training should be to familiarize the soldier with the sight rather than its use.)

b. Indirect Fire Sight M-34. The same objective applies to instruction in the use of indirect fire sight M-34 (figure 28, Volume XXIX, THE MAILING LIST). A similar chart facilitates the explanation of the M-34 sight.

c. Other fire control instruments. Students must be familiarized with the compass, binoculars, machine-gun clinometer M-1917, the M-10 plotting board, gunner's quad-

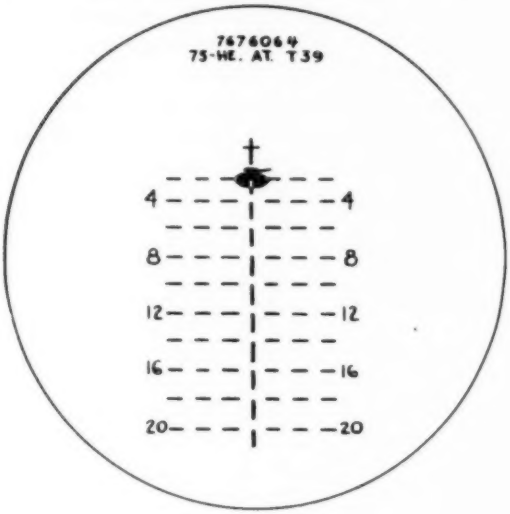


FIGURE 2(1).—Sight reticle M85-C with tank superimposed on zero deflection at 200 yards range.

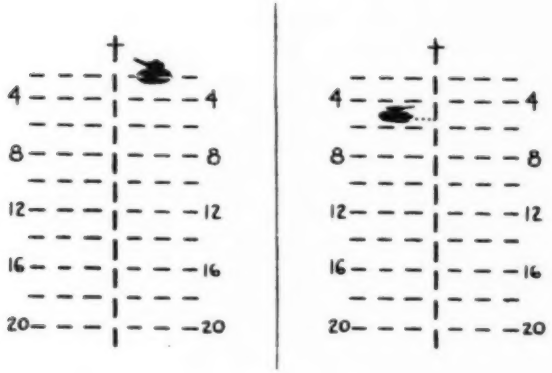


FIGURE 2(2).—Aiming for leads: Tank right to left at 200 yards, speed 10 mph (3 leads).

FIGURE 2(3).—Aiming for range and leads: tank left to right at 500 yards, speed 10 mph (3 leads).

rant M1, the aiming circle M-1, the instrument light M-2, and the range finder M-9. Enlarged charts of these instruments simplify this instruction.

d. Equipment, spare parts and accessories. In addition, to the fire control equipment, the soldier should become familiar with all of the equipment, spare parts, and accessories that are furnished with the weapon. It is not essential that he know the application of all of this equipment at this time; however, he must be thoroughly familiar with the equipment as to its operation, care, and maintenance.

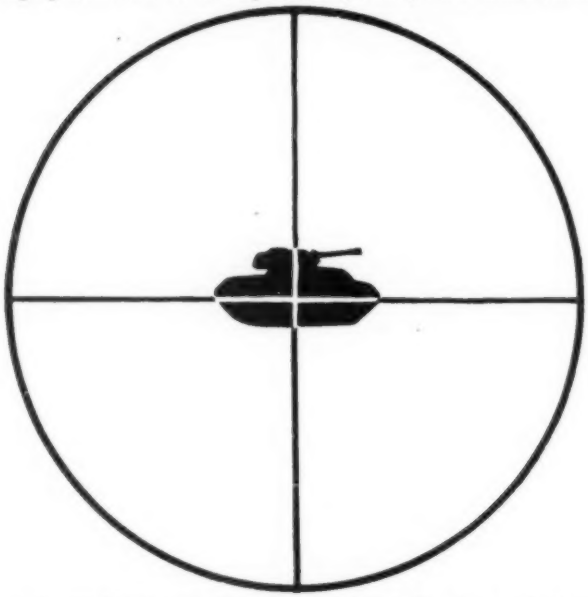


FIGURE 3.—Sight picture, direct fire, using indirect fire sight M-34.

SECTION II
CREW DRILL AND METHODS OF TRAINING

12. GENERAL. Listed in the paragraphs below are the organization, equipment, and duties of the squad, formation of the squad, procedure for examination of equipment, and procedure for placing the gun in and out of action.

a. The object of crew drill is to give the squad complete confidence in its ability as a team to put its gun into action with precision and speed.

b. The attainment of precision is the first step in developing an expert squad. This is attained by strict adherence to the prescribed procedure. Only after the desired degree of proficiency has been attained are the next phases —practice for teamwork and speed—undertaken.

c. Teamwork is assured by rotation of duties during drill so that each member, by practice, becomes acquainted with the duties of every other member, particularly with the more detailed actions of the numbers 1, 2, and 4. Continuity of action is assured by this phase of training.

d. Practice for speed is instituted as the last phase of instruction in crew drill. Care must be taken, during this phase, to insure that precision and teamwork are not sacrificed for speed.

14. ORGANIZATION AND EQUIPMENT FOR CREW DRILL. *a.* Normally, the squad will use only one of its two organic weapons for crew drill. The squad leader is a staff sergeant. He is armed with a M1 rifle and carries binoculars, compass, gunner's quadrant, firing tables, and the sights.

b. Number 1 (corporal) is the gunner. He is armed with a pistol and carries the tripod and cradle.

c. Number 2 (corporal) is the loader. He is armed with a pistol, wears a light pack, carries one thermite grenade, and assists in carrying the tube.

d. Number 3 (private) is a gunner's assistant. He is armed with a pistol, wears a light pack, carries one thermite grenade, and assists in carrying the tube.

e. Number 4 (private) is a gunner's assistant. He is armed with a pistol, wears a light pack, carries one thermite grenade, and assists in carrying the tube.

f. Number 5 (private) is an ammunition bearer. He is armed with a carbine, wears a light pack, carries one thermite grenade, and assists in carrying the tube up to the gun position whence he reverts to carrying ammunition.

g. Numbers 6, 7, and 8 (privates) are ammunition bearers. They are armed with the carbine and each carries two fragmentation grenades. They carry pack boards with two rounds of ammunition. Number 8, in addition, carries the rammer staff and waste for swabbing out the bore.

h. Number 9 (technician, fifth grade) is the vehicle driver (1½-ton truck with 1-ton trailer).

FIGURE 4.—75-mm recoilless rifle squad (less driver) with equipment.

15. DUTIES OF SQUAD MEMBERS. *a. Squad leader (observer).* The squad leader is in direct command of the gun and its equipment, including the vehicle. He conducts the squad in accordance with the orders and instructions of his platoon leader or of the commander of the unit to which he is attached. He is responsible for the care and maintenance of the gun and its equipment. In combat he is responsible for the accomplishment of the squad mission. He controls and conducts the fire of the gun and is responsible for its proper concealment. He keeps the platoon leader informed of the status of ammunition supply. He maintains ammunition supply by timely direction of the ammunition bearers.

b. Number 1 (gunner). Number 1 lays and fires the gun and acts as squad leader in the latter's absence. He coordinates his actions with number 2.

c. Number 2 (loader). Number 2 is responsible for complying with the fire commands in so far as the loading of the gun with the proper type of ammunition is concerned.

He coordinates his movements and duties at the gun with number 1. In the event that both guns of the squad are manned, he is the gunner of the second gun.

d. Number 3 (gunner's assistant). Number 3 takes up a position to the left of the gun for close-in defense. When the situation requires, he may carry ammunition from the vehicle to the gun. If both guns are manned, he is the loader of the first gun.

e. Number 4 (gunner's assistant). Number 4 directs the ammunition bearers in the placement of ammunition. It is his duty to select the proper type of ammunition, prepare it for firing, and hand it to number 2. If both guns are manned, he is the loader of the second gun.

f. Numbers 5, 6, 7 and 8 (ammunition bearers). Numbers 5, 6, 7 and 8 carry ammunition from the vehicle or squad dump to the gun at the direction of the squad leader. Otherwise they take up positions in defense of the gun—number 5 to the left and numbers 6, 7 and 8 to the right.

g. Number 9 (vehicle driver). Number 9 is responsible for driver maintenance of his vehicle and for its concealment and camouflage when halted.

16. SUPPLEMENTARY GUN AND AMMUNITION CARRIES. *a. Light machine gun tripod.* Although the light machine gun tripod is not normally part of the squad equipment, it may be used as a mount from which to fire the gun. When it is so used it may be left attached to the gun for carrying, or number 1 may be required to carry it. In either case, number 1 can carry two rounds of ammunition.

b. Two-man carry. Two men can carry the tube for short distances. The carry is facilitated by attaching two long wooden rods parallel to the tube in such a manner that the rods can be supported on the shoulders of the carriers. Numbers 2 and 3 initially carry the tube and numbers 4 and 5 form the relief team. In this method two additional men are free to carry ammunition.

c. Three-man carry. By attaching a cross bar and/or by the use of slings the gun may be carried for short distances by three men. Numbers 2, 3, and 4 carry the tube and number 5 is a relief member. The cross bar is affixed to the breech end and the carriers carry either by hand, or by slings strapped over their shoulders. The third man carries the muzzle end in a sling which may be held by the hand or strapped over the shoulder. This method affords one additional ammunition bearer.

d. Cart carry. The squad may be organized in such a manner as to employ three M3A4 hand carts. Two ammunition carts carry 15 rounds each while the third carries the gun fully mounted plus four additional rounds of ammunition. Tow ropes should be furnished for each cart. Numbers 1 and 2 tow the gun cart; numbers 3 and 4 tow one ammunition cart; and numbers 5 and 6 tow the other ammunition cart. Numbers 7 and 8 assist each cart in surmounting difficult obstacles. The squad leader should be free to reconnoiter routes and clear paths for the squad. This method is extremely difficult on rugged terrain but quite satisfactory for road marches. It offers the advantage of delivering a large supply of ammunition to the gun position.

e. Emergency carry. With either the light or heavy machine gun tripods in use, numbers 2, 3, 4, and 5 may carry two rounds of ammunition for short distances.

17. TO FORM THE SQUAD. At the command, FORM FOR CREW DRILL, the members of the squad fall in at attention in a column of twos behind the squad leader (figure 5). To clarify their positions for crew drill the sergeant commands, CALL OFF. In response the squad calls off from left to right and from front to rear; for example, the first man in the left file is number 1, the first man in the right file is number 2, the second man in the left file is number 3, etc.

FIGURE 5.—75-mm recoilless rifle squad at FORM FOR CREW DRILL.

18. TO POST THE SQUAD. At the command, POSTS, all squad members move forward at double time to positions directly behind their equipment which is laid out in order on the drill ground (figure 6).

FIGURE 6.—75-mm recoilless rifle squad at POSTS.

19. TO EXAMINE EQUIPMENT BEFORE DRILL. *a.* At the command, EXAMINE EQUIPMENT BEFORE DRILL, and while the men are still at posts, individuals examine equipment in the following manner:

(1) Squad Leader:

(a) Determines that he has the proper firing tables.

(b) Checks binoculars for broken parts and clean lenses.

(c) Checks gunner's quadrant for broken spirit level, lever arm, and spring. Closes cover.

(d) Checks compass to see that it is not broken and that the needle is still on pivot.

(e) Checks sights.

(2) Number 1:

(a) Checks traversing and elevating handwheels and centers them.

(b) Checks clamping and jamming handles.

(c) Checks dial clamp and zeroes the dial.

(3) Number 2:

(a) Checks chamber and breech to determine that the chamber is clear and the breech mechanism is in firing condition.

(b) Checks for Allen wrenches in breech handle.

(4) Numbers 6, 7, and 8:

(a) Check to see that ammunition is seated properly on pack boards.

(b) Check to see that all straps are properly adjusted for carrying.

(c) Determine what type of ammunition is on hand and where it is carried.

(d) Number 8 checks cleaning materials and rammer staff.

(5) Number 4: Moves to the number 6, 7, and 8 positions, checks type of ammunition being carried and its location on the various ammunition bearers.

b. When all equipment has been thoroughly and properly checked the following commands are given from rear to front:

(1) Number 8 reports, CORRECT.

(2) Number 7 reports, CORRECT.

(3) Number 6 reports, AMMUNITION CORRECT.

(4) Number 2 reports, CORRECT.

(5) Number 1 reports, GUN AND AMMUNITION CORRECT.

(6) The squad leader reports, ALL CORRECT.

20. TO SECURE EQUIPMENT. The squad leader gives the command, SECURE EQUIPMENT, and places himself facing in the direction of march. Number 1 picks up the tripod and cradle and places himself behind the squad leader. Number 2 takes position at the right tube carrying

handle. Number 3 takes position at tne left tube carrying handle. Number 4 takes position at the breech handle. Number 5 takes position at the trigger handle. Numbers 2, 3, 4, and 5 lift the tube. Numbers 6, 7 and 8 sling ammunition and take positions in column behind the gun. The squad leader then signals and commands, FOLLOW ME.

21. TO PLACE THE GUN INTO ACTION. At his command, ACTION, the squad leader designates the direction of fire and points to the spot upon which the gun is to be mounted. He then moves off to the left front of the gun where he can control the gun and observe the target. Number 1 swings the tripod to the ground,*trail leg to the front and in direction of fire,* then raises the pintle latch lever and stamps the trail leg into the ground. Moving to the left he receives the sight from the squad leader. As number 1 moves to the left, numbers 2, 3, 4 and 5 place the tube on the tripod; number 5 lowers the pintle latch lever, depresses the trigger, and opens the breech; number 2 removes the elevating pin from its carrying recess, and when the gun has been correctly positioned, places it through the front mounting bracket; number 3 stamps in the left leg; number 4 stamps in the right leg; numbers 3 and 5 move to the left front of the gun and take up security stations in defense of the gun. In the meantime number 1 has placed the sight on the gun, locked it in place, and taken up firing position on the left of the gun. Numbers 1 and 2 take up positions at the gun whereby they can best service the piece. (Sitting, kneeling on one or two knees, or squatting positions are all satisfactory. In the kneeling position the knee nearest the breech should be on the ground.) Number 2 checks the bore for any obstructions, and reports, CLEAR, to indicate to the gunner that the bore is clear. Numbers 6, 7 and 8 bring up their pack loads of ammunition and place them in a semicircle as directed by number 4. Number 8 places the rammer staff and waste near number 4 where he can easily reach it. They then take up security stations to the right of the gun; number 8 to the right front; number 7 to the right oblique, and number 6 to the right flank. Number 9 is the vehicle driver and will not normally

leave the vehicle. The gun is now ready to fire upon reception of the fire command from the squad leader. On receipt of the fire command, all elements of which are repeated by number 1, number 4 draws the designated type of ammunition from its container and passes it to number 2 who inserts it in the chamber, mates the pre-engraved rotating band with the lands and grooves in the tube, and seats the round firmly. He then closes the breech and taps the gunner's hand to indicate that the gun is ready to fire. Number 1 lays the gun on the designated target, takes the correct sight picture, places his hand above the chamber, and waits for the tap from number 2 indicating that the gun is ready. On receipt of the tap, he rotates the safety and depresses the trigger. After the round has been fired, number 1 opens the breech. Number 2 grasps the base of the expended round with his left hand and throws it to the rear.

22. TO TAKE THE GUN OUT OF ACTION. The squad leader commands, OUT OF ACTION. At this command number 2 clears the gun, closes the breech, removes the elevating pin, and replaces it in its carrying recess; number 1 removes the sight and hands it to the squad leader. Numbers 2, 3, 4 and 5 take their places beside the gun. Number 5 lifts the pintle latch lever. Numbers 2, 3, 4 and 5 pick up the tube and move to the rear. Number 1 swings the tripod to his shoulders. Numbers 6, 7 and 8 pick up their pack boards and fall in behind the tube. Number 8 also picks up the rammer staff and waste. The squad is prepared to move out on command from the squad leader.

23. TO CHANGE NUMBERS AND DUTIES DURING CREW DRILL. The squad leader commands, FALL OUT ONE (TWO, etc). At this command, number 2 moves to the position of number 1 and calls out, ONE. Each succeeding man moves up one number and calls out his new number. Number 1 moves to the position of number 8. (Number 9 does not take part.) As soon as each member has become thoroughly familiar with the duties involved, the command is given during the progress of a movement to cause each man to cease the execution of his duty and to

take up the duty of a new number. (Caution must be observed that the command is not given while the tube is being hand-carried since it is difficult to change over at that time.)

24. METHODS OF INSTRUCTION. The methods of instruction used for crew drill vary somewhat depending upon the size of the group. Where instruction is given in a unit, equipment should be available for each squad. Where larger groups are instructed, equipment may not be available in sufficient quantities to provide each squad with all of the required equipment. In this event a demonstration squad, fully equipped and trained, is used and the available equipment rotated among groups. In any event, a demonstration is given, accompanied by an explanation of each item of equipment, its use, and the duties of each member of the squad. This is followed by a demonstration of each phase of crew drill and practical work before the next phase is introduced. One hour periods, including explanation, demonstration, and practical work in each phase is the maximum. Otherwise, lack of interest results.

SECTION III

MARKSMANSHIP AND METHODS OF INSTRUCTION IN MARKSMANSHIP

25. PURPOSE. The purpose of this section is to provide uniform methods of training individuals to deliver prompt and accurate direct fire on stationary or moving targets. Courses of instruction and rules and regulations for the conduct of marksmanship training are included.

26. FUNDAMENTALS. To be capable of delivering prompt and accurate fire on stationary or moving targets, the soldier must be thoroughly trained in the following fundamentals:

a. Correct sighting and aiming.
b. Correct positions.
c. Correct trigger manipulation.
d. Knowledge of range estimation.
e. Knowledge of speed estimation.
f. Knowledge of lead estimation.
g. Tracking exercises.

27. PRIOR TRAINING. The soldier should be proficient in mechanical training and be throughly familiar with the operation and use of rifle accessories.

28. PREPARATORY EXERCISES. *a.* The purpose of preparatory exercises is to teach the soldier the essentials of marksmanship and to develop fixed and correct habits of marksmanship before he begins range practice. A thorough, carefully supervised course in preparatory exercises conserves time and ammunition during range practice and inculcates in the individual automatic procedures which eliminate accidents.

b. Preparatory exercises are divided into eight consecutive steps which should be concentrated in the period of time allotted:

(1) Sighting and aiming exercises.
(2) Position exercises.
(3) Trigger manipulation exercises.
(4) Range estimation exercises.
(5) Speed estimation exercises.
(6) Lead estimation exercises.
(7) Tracking exercises.
(8) Examination.

29. SIGHTING AND AIMING EXERCISES. (For description of Sight M85C see Volume XXIX, THE MAILING LIST.) *a. Sighting and Aiming with Sight M85C.* (Direct fire up to 2100 yards.)

(1) *Aiming for range.* Exercises should be conducted on stationary 1000-inch "A" targets. The exercise should not involve tracking. The gunner is required to set the correct sight picture for every 100 yards of range (see figure 2).

(2) *Aiming with leads.* The distance by which a target is led is measured from the point of aim and is equal to the distance the target will travel between the time the projectile leaves the rifle and the time its trajectory crosses the path of the target. This distance is known as lead and varies with the speed and path of the target. Five mils are taken as the unit and equal one lead. Three leads (15 mils)

are used for each 10 mph that the target is moving when the path of the target is at an angle of 45° or greater to the line of fire. When the path of the target is at an angle less than 45° to the line of fire, half this number of leads should be used. Exercises are conducted which require the gunner to set appropriate lead markings on a caliber .22—.30 "A" Subcaliber target (1000″). The target remains stationary, but is assumed to be moving right or left at various angles and speeds at a range of 200 yards.

(3) *Aiming for range and leads.* Range and lead are combined automatically within the telescope by a series of horizontal lines extending from the right and left of center at 400 yard intervals. For targets requiring leads at ranges other than those etched on the reticle, interpolation is necessary. The interpolated aiming point is then laid on the center of the target. Each gunner is required to lay the rifle on the target (cal. .22—.30 "A" Subcaliber 1000″) at various ranges and leads. The target remains stationary with an assumed direction and speed being specified in each case. Ranges and leads requiring interpolation should be included. At least one period of training will be devoted to use of the lighted reticle to accustom all men to sighting and aiming with the telescope during the hours of limited visibility.

b. Sighting and Aiming with the M-34 Sight. (For *direct fire* for ranges over 2100 yards.)

(1) Aiming for range. In using the indirect fire sight for direct fire, the sight must be first adjusted for vertical parallelism. (This procedure is discussed in Chapter 2, par 25, Volume XXIX, THE MAILING LIST.) When this operation has been performed the M-34 sight may be used for direct fire. Estimate the range to the target, set this range on the elevation quadrant in mils, and raise the tube until the cross hair of the telescope is laid on the center of mass of the target. (see figure 3.)

(a) Exercises are conducted at any range using a stationary 1000-inch "A" rifle target with an assumed range over 2100 yards.

(b) It is not to be construed that the M-34 sight cannot be used for ranges under 2100 yards. A direct fire sight (M85C) is furnished for this purpose and can be used more rapidly since leads and ranges are combined automatically on the telescope reticle. However the M-34 sight may be used if desired.

(2) *Aiming with leads using M-34 Sight for direct fire.* Leads may be set off on the sight using the same rule as given above for direct fire. These leads may be applied to the M-34 sight by setting the desired number of leads in mils on the deflection quadrant.

(a) Exercises should be included in marksmanship training which require the gunner to set various leads on a stationary target, using assumed ranges, speed and direction of movement.

(3) *Aiming for range and leads.* Combination of exercises as given in (1) (a) and (2) (a) above should be conducted until the gunner has attained the desired efficiency in sighting at stationary targets, at assumed ranges, with speed and direction given. A 1000-inch "A" rifle target may be used at any range.

c. Sighting and aiming with M-34 Sight for indirect fire. (For description of the sight, see paragraph 24, Chapter 2, Volume XXIX, THE MAILING LIST.)

(1) *Aiming for range.* When firing indirect fire, the range element of the fire command is given in mils. This conversion is readily available on a firing table. For example: the elevation in mils required for 3000 yards is 177.3 mils. To aim the rifle for this range, set 100 mils on the elevation scale. This is accomplished when the first graduation above "O" is opposite the index of the elevation scale; then turn the elevation micrometer until 76 mils is opposite the index of the micrometer scale. Since the micrometer is graduated in 2 mil increments, it is necessary to interpolate half way between 76 and 78 mils on the elevation micrometer scale to obtain a reading of 77 mils. The .3 mil is dropped since it is less than one-half mil. To complete the operation and produce the desired elevation of the

tube, manipulate the elevation handwheel and cradle and raise the tube until the bubble in the longitudinal level is centered.

(2) *Aiming for direction.* When aiming for direction using the indirect fire sight, the initial direction is given as a base deflection for each gun when the battery is put in position to fire. Thereafter, changes in direction are given as references left or right so many mils from base deflection. *When the change is left, add the change in mils to base deflection; when the change is right, subtract the change in mils from base deflection.* The keyword "LARS" (left, add; right, subtract) will assist in remembering whether to add or subtract changes in deflection. For example the command is BASE DEFLECTION, RIGHT 40. The gunner subtracts 40 mils from base deflection and sets this reading on the azimuth scale and azimuth micrometer. He then moves the tube until the cross hair of the telescope reticle is on the left edge of the aiming stake. It is not necessary to check the cross level bubble. (However, when first placing the gun in position, it is necessary to level the dial and center the cross level bubble. Thereafter, unless the tube cants to an extreme angle, the cross level bubble is not checked.)

(3) *Exercises.* For satisfactory exercises, see gunner's test, paragraph 38c (2).

30. POSITIONS. Instruction in positions includes positions for the gunner and assistant gunner when firing at stationary or moving targets. (See paragraph 21 and figures 7 and 8.)

31. TRIGGER MANIPULATION. The gunner grasps the trigger handle with his right hand, thumb on the trigger, fore finger or middle finger rotating the trigger safety, and with a smooth, steady rearward pressure on the trigger, fires the piece. Care must be taken not to throw the rifle off the target or aiming point while rotating the trigger safety or depressing the trigger. The correct sight picture is maintained while firing.

FIGURE 7.—The sitting position.

32. RANGE ESTIMATION. Accurate range estimation is essential to obtaining hits with a minimum expenditure of time and ammunition. Estimation of the range to targets, stationary and moving, should be stressed until the desired proficiency is attained. The standard methods of training in range estimation are used.

FIGURE 8.—The kneeling position.

33. SPEED ESTIMATION. *a.* Speed estimation is an essential phase of preliminary marksmanship training. The firer must base the number of leads upon his estimation of the speed of the target. Constant practice in estimating the speeds of moving targets is the only method by which the individual can acquire accuracy in speed estimation. Training must include the use of many targets at various ranges, speeds, and directions of movement.

b. Exercises in speed estimation should be conducted in the form of examination with targets moving according to a prearranged plan. Initially the squad is shown by demonstration the appearance of different targets moving at announced speeds and ranges. Each man is then required to estimate the speed of targets moving at various ranges in various directions.

34. LEAD ESTIMATION EXERCISES. Exercises are conducted with targets moving at various ranges, speeds and directions. The individual computes the necessary leads based upon observation of the target in accordance with the method of lead determination as per paragraph 29*a* (2).

35. TRACKING EXERCISES. When the gunner has become proficient in the previous steps of marksmanship, training in tracking moving targets should be conducted on 1000-inch ranges with predetermined speeds and ranges. Training should be continuous, progressing to vehicles, tanks, etc, moving first at predetermined ranges and speeds and finally to undetermined ranges and speeds. Sufficient exercises should be conducted to bring the gunner to a high level of proficiency.

36. EXAMINATION. Before range practice is begun each man should be examined and determined to have attained the desired proficiency. The type of examination need not be the same for all individuals. An oral applicatory examination at the close of each phase of marksmanship followed by a general review of all phases on the completion of marksmanship training is normally satisfactory.

37. INSTRUCTION PRACTICE. *a.* Until such time as qualification courses are published, the following suggestions are offered as the next phase of training for individuals who have completed mechanical training and preliminary marksmanship.

b. Time, facilities, and ammunition allowances will determine the amount of firing.

c. Individuals should be instructed in a gunner's test, similar to the one suggested below, and in firing at stationary, moving, silhouette, landscape, and field targets at known and unknown ranges, with targets both visible and camouflaged. Firing should consist of 1000-inch subcaliber, midrange subcaliber, and service ammunition firing, or a combination based upon the availability of ranges and conducted in accordance with AR 750-10.

d. The following fundamentals should be emphasized:

(1) Rapid and accurate delivery of the initial round.
(2) Rapid and accurate delivery of subsequent rounds.
(3) Rapid determination of speed, lead and range.
(4) Rapid and accurate laying for indirect fire.

e. For safety precautions, range procedure, operation diagrams, and conduct of fire, see paragraph 39.

38. INSTRUCTION PRACTICE. *a. Equipment.* The following equipment is required:

1—75-mm rifle, complete with sight M85C mounted on tripod M1917A1.
1—screwdriver per rifle.
1—subcaliber device per rifle.
1—cresent wrench per rifle.
1—set bore sighting equipment per rifle.
1—stop watch.
1—M-34 sight per rifle.
1—gunner's quadrant per rifle.
1—firing table per rifle.
1—pencil and paper for each firer.

b. Procedure. The gunner should be permitted 10 rounds to zero his rifle. Five rounds of caliber .30 carbine ball ammunition are fired at the 1000-inch "A" rifle target.

Using an assumed range of 700 yards, the sight is adjusted on the center of impact. The remaining five rounds are fired to confirm the adjustment.

a. Gunner's Test. (1) *Part 1. Bore sighting for indirect fire (using M-34 sight).*

(a) *Equipment.* As listed in par 38*a* above.

(b) *Conditions.* The telescope will be thrown off in deflection and elevation. No aiming point is given.

(c) *Requirement.* The gunner must select an appropriate aiming point and bore sight the rifle. (Loader may assist in the operation under the direction of the gunner.)

(d) *Scoring.* If the gunner makes an error of one mil or more no credit is given. (A time limit should be imposed also with appropriate credit for time taken.)

(2) *Part II. Laying the rifle for indirect fire (with M-34 sight.)*

(a) *Equipment.* As listed in par 38*a* above.

(b) *Conditions.* The rifle is mounted on a tripod with an aiming stake set at a convenient distance. The rifle is laid on the stake with a reading of zero mils deflection and zero mils elevation. The elevation screw on the tripod has one inch exposed, and the traversing mechanism is centered.

(c) *Procedure.*

1. Each gunner takes the gunner's position on the left of the gun and lays it as prescribed above.

2. When ready, the gunner is given the initial fire command by the testing officer.

Example: BATTERY
HE
BASE DEFLECTION, RIGHT 125
NUMBER ONE, ONE ROUND
ONE ONE ZERO
FIRE

3. The gunner sets the above data on the sight, lays on the aiming stake, levels the longitudinal bubble, and reports, UP.

4. The testing officer then gives three subsequent fire commands.

Example: LEFT FOUR ZERO
EIGHT FIVE
FIRE

5. Time is counted from the time of the first element of the initial fire command in each case to the report, UP by the gunner. The total time for the initial fire command and each subsequent change is the time recorded for the test.

6. Time out is taken to permit the testing officer to check the gun on completion of each phase of the test

7. In order to receive scoring credit, all of the following must be correct:

(*a*) Sight must be set correctly for elevation and deflection.

(*b*) Longitudinal bubble must be level.

(*c*) Vertical line of reticle must be on the left edge of the aiming stake.

8. The gunner is given three trials. The gunner's score will be the average of the three trials. (A time element should be imposed, with a time of three minutes or less recommended for full credit.)

(3) *Part III. Computation of minimum QE for troop clearance.*

(a) *Equipment.* As listed in par. 38*a*.

(b) *Conditions.* The gunner takes his place at the gun with the necessary equipment. The testing officer will indicate to him the point on the mask to which troop clearance is to be computed.

(c) *Procedure.* The gunner estimates the range to the mask and records it. He then measures the angle of site to the mask and records it. The gunner then computes the minimum quadrant elevation.

(d) *Scoring.* The amount of error in computation and time required should determine the score of the gunner.

d. Subcaliber firing, 1000-inch stationary target. The target recommended for this type of firing is the 1000-inch "A" rifle target. Four targets are placed on a MG target frame spaced twelve inches apart laterally, and six inches vertically, forming a rectangle.

e. Subcaliber firing, 1000-inch moving target. (1) The caliber .22-30 "A" 1000-inch subcaliber target is recommended for subcaliber firing.

(2) The speed of the target should be varied from 12 to 16 or 24 inches per second with a respective exposure time of 41, 31, and 21 seconds. (These speeds correspond to 7½, 10, and 15 mph.)

(3) The following number of leads are recommended: Zero leads for 7½ mph, one lead for 10 mph, and two leads for 15 mph.

(4) The target makes one run to the right and one run to the left at each speed.

(5) The procedure to be followed and commands recommended for the officer in charge of firing are as follows:

(a) LAY GUN ON AIMING STAKE (in center of target run).

(b) SUBCALIBER, LOAD.

(c) ALL GUNS LAY ON AIMING STAKE AND LOAD.

A fire command is then given.

Example: MOVING TARGET
SUBCALIBER
LEFT (RIGHT) FRONT
TOP (CENTER OR BOTTOM) TANK
THREE FIVE
ONE LEAD
FIRE

f. Midrange subcaliber known distance firing at stationary targets.

(1) Ranges recommended for this type of firing are from 200 to 400 yards inclusive.

(2) Targets recommended are the Prone "F" M1917 for short range, and the Kneeling "E" M1917 for longer ranges. Carbine Tracer ammunition is recommended.

(3) Scoring should be accomplished by scorers in pits with telephone communication to the firing line.

(4) Firing should be conducted on a field firing range employing terrain such that the gunner may observe the

strike of his bullet and adjust therefrom. If the recommended range facilities are not available, a known distance rifle range may be substituted, using "E" and "F" targets M-1917.

g. Midrange subcaliber firing at moving targets.

(1) An actual tank should be used for a moving target if available.

(2) Carbine tracer ammunition should be used.

(3) The type of range recommended is a known distance moving target range, with the target run 450 yards from the firing line and the course 300 yards in length.

(4) A towed target, as illustrated in figure 9 may be substituted if tanks are not available.

(5) When a tank is used, scoring may be accomplished by observation of the strike from the firing line by scorers. When a towed target is substituted the target should be marked.

(6) The speed of the target should be varied from 10 to 15 mph, with the target making alternate runs to the right and left at each speed.

(7) Three leads are recommended for 10 mph; four and one-half leads for 15 mph.

h. Service firing, known distance. (1) Ranges must conform to the specifications set forth in AR 750-10, to include the safety requirements prescribed therein.

(2) Target practice ammunition is recommended. (Inert rounds may be used as a substitute.)

(3) Targets recommended are panel type, three feet by five feet for short ranges; six feet by six feet for intermediate ranges; and six feet by twelve feet for the longer ranges.

(4) The range from gunner to target should be between 500 and 1800 yards.

(5) Scoring may be accomplished by observation of the strike of the projectile by a scorer.

i. Transition firing. (1) *Purpose and scope.* This phase of training gives the individual gunner practice in searching areas, estimating ranges, and firing rapidly and accurately.

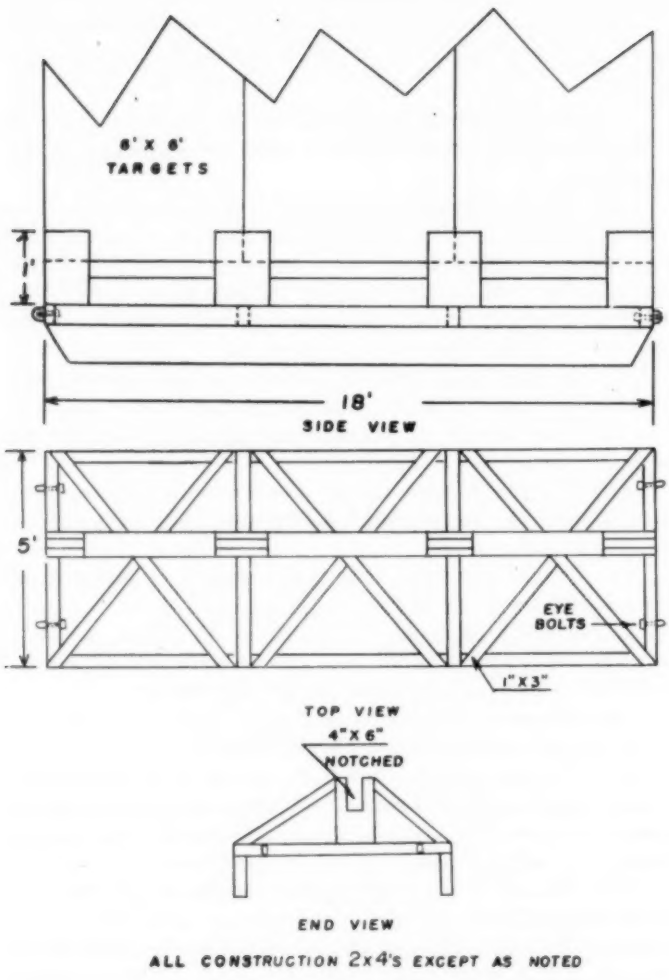


FIGURE 9.—Plan for constructing towed target for subcaliber firing.

(2) Ranges, personnel, and procedure recommended for use are contained in paragraph 189, FM 23-5.

(3) Type target recommended is the Prone "F" M-1917 for shorter ranges, with Kneeling "E" M1917 for longer ranges.

(4) Distance from gunner to target should vary from 100 to 500 yards. (None of the ranges is disclosed to the gunner.)

(5) Firing should be conducted with carbine tracer ammunition, using the subcaliber device.

(6) Recommended procedure for scoring is to give credit for all hits, with a specified number of rounds allowed for each target. Additional credit should be given for unexpended rounds where all targets are hit.

(7) A time limit should be imposed on the gunner similar to that outlined in the transition course for the M1 rifle with additional time allowed to compensate for the slower rate of loading.

(8) Target scoring may be accomplished by scorers in pits utilizing telephone communication to the firing line.

j. Landscape target firing. (1) Landscape target firing may be conducted in accordance with paragraphs 145-146, 148, (except (3) and (4)), 149*a*, 150*a*, *b*, *d*, *e*, *f*, 151*a*, and 152 of FM 23-5.

(2) Exercises should be designed to provide practice in fire commands and fire control for both squad and section leaders.

k. Field firing. (1) *Purpose.* The purpose of field firing is to demonstrate individual and crew proficiency in all phases of marksmanship. The unit is conducted through a series of exercises which simulate battlefield conditions as nearly as possible. The situation for each exercise should be given by the instructor who will act as umpire. The tactical commanders direct and control their units in the actions required. The terrain should be varied for each exercise so that the unit is presented with a new situation for each problem.

(2) *Direct fire.* (a) The scope of these exercises should test the ability of the squad leaders to control their units and to properly engage various type targets, and to

test the members of the squad in the selection of positions, use of individual cover and concealment, ammunition supply, and technique of fire.

(b) The situation should be so drawn that the squad leader will be given pertinent portions of a field order while his squad is in an assembly area. The order should include firing position area, target areas, sectors of fire, and location of friendly troops. As the exercise progresses targets are indicated to the squad leader by the umpire. Fire for effect is not a part of these exercises and as soon as the fire has been adjusted, the duties of the crew are rotated and a new target is designated. The squad leader must be prepared at any time to displace forward, move to an alternate position, or withdraw to a covered area. Selection of the proper type of ammunition is the responsibility of the squad leader.

(c) Suggested types of targets are:

1. Camouflaged, cave-type fortifications; cave openings to be two feet by one foot; range 400-600 yards.

2. Mock tank, or tank chassis; range 800-1000 yards.

3. Camouflaged log and earth pill box; range 800-1000 yards.

4. Pill box (requiring the squad leader to smoke the apertures); range 400-500 yards.

(3) *Indirect fire.* (a) These exercises should test the ability of platoon and subordinate leaders to control their units and to properly engage various types of targets with indirect fire, and should test the members of the platoon in the application of principles in the selection of positions, use of individual cover and concealment, ammunition supply, and technique of fire.

(b) The initial situation should be similar to that in the preceding problems wherein the platoon is in an assembly area and the platoon leader is furnished extracts of a field order. However, care should be taken that the situation is presented so that indirect fire is mandatory.

(4) *Ammunition.* These exercises are designed for the use of service ammunition. Where range facilities are inadequate, caliber .30 carbine ammunition using subcaliber devices may be substituted; however, the leader should be required to specify the type of ammunition he would use if firing service ammunition.

(5) *Critique.* At the completion of each exercise the instructor should conduct a critique covering the following points:

(a) Reconnaissance.
(b) Action and orders of unit leaders.
(c) Suitability of observation posts.
(d) Suitability of firing positions.
(e) Suitability of alternate positions.
(f) Use of cover and concealment.
(g) Technique of fire.
(h) Ammunition resupply plans.
(i) Proper employment of types of ammunition.

(Care should be taken by the officer conducting the critique to avoid confusing effectiveness of fire with overall unit performance.)

39. SAFETY PRECAUTIONS AND PROCEDURE FOR FIRING. *a.* Because of the danger to personnel created by the back blast of recoilless weapons, extreme care must be exercised in all phases of instruction. From the earliest stages of training, this danger must be emphasized. Crew drill, position exercises, tracking exercises, or subcaliber firing must be conducted as though actual service ammunition were being fired.

b. All firing will be controlled by definite fire commands.

c. During the initial phases of instruction firing, the officer conducting firing, may, at his discretion, reduce the speed of the target and the number of rounds fired in each run. The object of this procedure is to increase confidence and place emphasis on manipulation and accuracy.

d. All exercises should be fired in the order in which they are listed.

e. Moving target firing should be preceded by one or more dry runs.

40. DUTIES OF PERSONNEL. *a. Officer in charge.* The officer in charge of range practice is responsible for:

(1) Coordination and supervison of the firing line and assignment of firing points to emphasize safe and smooth operation of all firing.

(2) Issuance of fire commands and general instructions to the firing line.

(3) Enforcement of safety precautions.

b. Company Commander. The company commander is responsible for the efficiency of the marksmanship training in his organization.

c. Scoring Officers. (1) Scoring officers should be detailed to supervise record practice firing. Officers for this duty should be detailed from organizations other than the one firing. They will familiarize themselves thoroughly with their duties and the firing procedure prior to the date of record practice firing.

(2) Scoring officers will:

(a) Check dimensions of the targets, aiming silhouettes, and scoring spaces, and see that the range is laid out as prescribed.

(b) Inspect each target before firing to insure that it contains no unpasted shot holes.

(c) Count number of rounds of ammunition to be fired by the gunner for each exercise.

(d) Determine that firing is being conducted in accordance with the prescribed procedure.

(e) Check the time of exposure of moving targets and render a decision in the event of irregularities.

(f) Verify and render decisions on all misfires and malfunctions at the guns.

(g) Render a decision in the event of breakage or stoppage of any of the range apparatus.

(h) Score targets on each exercise fired and record the score.

d. Coaches. During all preparatory training practice a coach will be present at each gun to instruct and assist

the gunner. No coach will be present at the gun for record firing. Each coach will:

(1) Require each gunner and loader to observe all pertinent individual and general safety precautions, and see that he complies with the instructions pertaining to the service of the piece.

(2) See that the proper number of rounds is present at the piece for each exercise.

(3) Supervise generally the work at the gun and make sure that the commands are executed properly. Repeat commands and instructions which are necessary to insure correct understanding and timely execution.

(4) Report all misfires, malfunctions, or discrepancies to the officer conducting firing.

(5) Score the targets and critique the firing.

e. Loader. (1) The primary duty of the loader is to serve the piece during all firing exercises. During instruction practice he may also act as assistant coach. During record firing he will not coach or instruct the gunner in any way.

(2) Each loader will:

(a) Load the rifle in accordance with the commands of the officer conducting firing.

(b) Tap the gunner and report, UP when the weapon is loaded and he is completely clear of the breech.

(c) Signal "ready" to the officer conducting the firing.

(d) Repeat all orders to unload, cease firing, and clear gun.

(e) Announce to the gunner the number of rounds fired on each exercise when required.

f. Feeder. (1) The feeder controls the movement of personnel to and from the firing line and allows no movement behind the line of guns except under the direction of the officer conducting firing.

(2) The feeder will:

(a) Prohibit personnel from moving to or from the firing line except when all breeches are opened and personnel are standing free of the guns.

(b) Send subsequent orders to the guns on command of the officer conducting firing.

(c) Raise a red flag at the end of the firing line except when all breeches are open, all personnel are clear of the guns, and instructions are received from the officer conducting firing.

(d) Prohibit movement behind the guns while the red flag is raised.

41. ORGANIZATION. *a.* Organization of the firing line will be in accordance with figure 10.

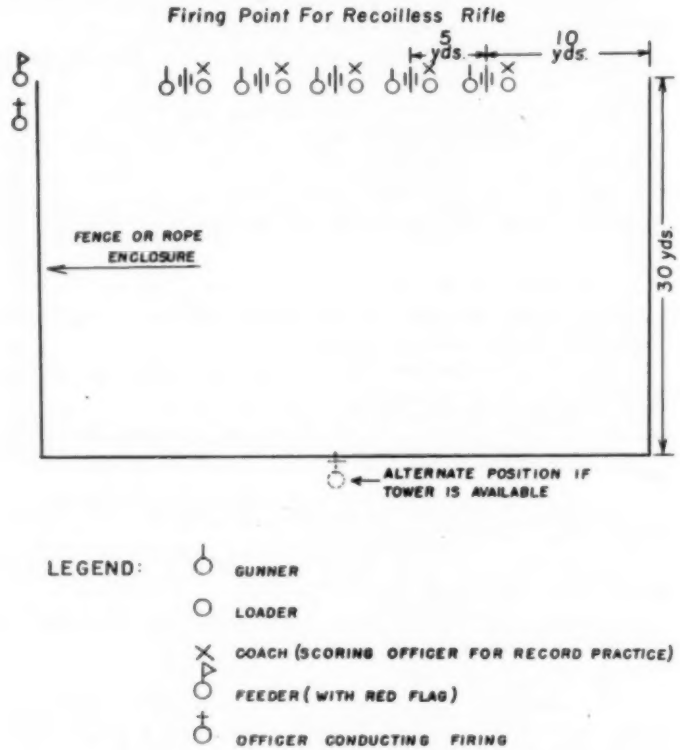


FIGURE 10.—Organization of the range for firing.

b. Duties of personnel are outlined in paragraph 40.

c. Personnel will not be allowed to enter the fenced or roped off enclosure unless actually required on the firing line.

d. No one may enter or leave the firing line nor move between guns when the red flag is raised.

e. Prior to any firing, each gun will be carefully checked by an officer to insure that it is in firing condition.

42. INSTRUCTION PRACTICE FIRING. *a. General.* (1) Before firing, the officer in charge will give a descripton of the range and announce specific instructions pertaining to firing procedure.

(2) Guns will be numbered from right to left.

(3) The coach, loader, and gunner take positions at the gun. The gunner tests the firing, elevating, and traversing mechanism; the loader secures the necessary ammunition.

(4) When all guns are prepared for firing and the safety regulations checked, the officer in charge gives the fire command.

(5) At the completion of an exercise the officer conducting firing commands, CEASE FIRING. The loader rapidly unloads, and all personnel stand clear of the gun. The loader then signals to the officer in charge.

b. Stationary target firing. An example of the sequence of a fire command is as follows: FIRE MISSION, SUBCALIBER, FRONT, TARGET, THREE FIVE. When all guns are ready the officer conducting firing commands, FIRE. Each gunner will fire as directed until his ammunition is expended, or until the command, CEASE FIRING is given.

c. Moving target firing. An example of the sequence of the fire command is as follows: GUNS ON AIMING STAKES, LOAD. When all guns are ready a subsequent fire command is given: MOVING TARGET, SUBCALIBER, LEFT FRONT, TANK, THREE FIVE, TWO LEADS, FIRE. When the target has completed its run the command CEASE FIRING is given. The same type of fire command is given for the return run.

d. Record Practice firing. (1) The same procedure as prescribed for instruction practice firing, except as noted below, will be employed for record firing.

(2) Each man will complete the prescribed instruction practice firing for the course specified prior to record practice firing.

(3) As a rule, record practice firing will not be fired on the same day that any portion of instruction practice is fired. However, when the time allotted is limited the unit commander may authorize record practice firing on the same day.

(4) Before firing any exercise for record, the gunner will be given a reasonable length of time to check the condition of his gun, sight, and ammunition.

(5) The gunner will be required to bore sight or target his own weapon prior to firing for record.

(6) The target speed or allotted time will be announced to each gunner prior to firing.

(7) In record practice firing, when a misfire, stoppage, or malfunction occurs, the gunner or loader will hold up his hand and call, "Stoppage." Thereafter, neither the loader nor gunner will touch the gun until instructed to do so by the scoring officer. The scoring officer will examine the gun.

(8) If a misfire, stoppage, or malfunction occurs through no fault of the gunner the score will be disregarded and the gunner permitted to refire the exercise.

(9) Decisions to disregard score or authorize refiring of portions of the course rest with the scoring officer.

(10) If a misfire or malfunction is manifestly the fault of the gunner, he will not be permitted to refire the portion of the course affected.

CHAPTER 2

Fighting Fear

Mark Twain once said: "Everyone talks about the weather but no one does anything about it." Much the same can be said of fear. Although most combat experienced personnel know and realize how potent fear can be in reducing the combat efficiency of an individual or even an entire unit, few constructive measures have been offered to correct the situation. There are actually many things that can be done, both prior to and during combat, to condition or harden the soldier mentally against the rigors of combat and assist him in overcoming or controlling fear. These are things that can be done by the individual and small unit commanders, correcting the deficiency in many cases before it can manifest itself in the form of psychoneurosis or "battle fatigue."

A great deal of time is taken to teach the soldier to use his weapons, to make the best possible use of cover and concealment, and to care for himself in combat; always with the object in mind of physically subduing or overcoming the enemy. Yet he receives practically no instruction that will enable him to combat one of his greatest enemies—*fear*. Any experienced combat commander will agree that fear produces more combat ineffectives than all the weapons of the enemy combined. Just recently a colonel who served overseas with a famous fighting division made this statement: "We need to do something about this business of 20 per cent of our soldiers doing all of the fighting."

What can be done about it? The answer to this question lies in a few of the fundamental concepts concerning behavior and emotion. Generally speaking, a man's actions are controlled by his needs; he tries to do what he wants

to do, though he may be frustrated by obstacles, or one need may be in conflict with another. The satisfaction of any need involves making a decision or a preference. Expressing preference is the most fundamental thing that man does. All action, all interest, or all attention consists simply of choosing. Shall I look at this or at something else? Do I want this or don't I? These are the questions that each individual subconsciously asks himself and answers thousands of times each day.

Exercising these preferences develops certain likes and dislikes in each individual. Thus, man can learn to either like or dislike almost any simple thing. For example, pain is nearly always *disliked.* Yet a man will choose to give himself the pain of scratching an itching place. Warmth is nearly always *liked* but on a hot and humid day the body needs coolness, so warmth is avoided. *Preference then, depends on the total situation—or a choice of the lesser evil.*

It is these simple mild preferences that become emotions when they are sufficiently intensified. A man may like a vivid red and dislike a dirty green but he is *delighted* by a sunset and *disgusted* by a rubbish heap. At the upper extreme of intensity he is *overjoyed* when he sees the enemy in full retreat or *horrified* when a bursting shell kills his buddy. Thus a feeling or emotion can occur in all degrees of intensity.

Man has a use for emotion as it produces a state of preparedness for both mental and muscular activity. The source of this activity is centered in that portion of the nervous system referred to as the "sympathetic nervous system," which is affected by violent or unpleasant emotions.

Everyone can recall some of the sensations that accompany an emotion such as: thumping of the heart, face hot or flushed, mouth and throat dry, breaking out in a cold sweat, crying, spine tingling, or a general feeling of tenseness, especially in the stomach. These sensations all have a physiological basis in that the sympathetic nervous system causes various organs of the body to react in a certain way (see Table I).

TABLE I

REACTIONS OF THE SYMPATHETIC NERVOUS SYSTEM TO EMOTION

HEART	SPEEDED UP
SURFACE ARTERIES	DILATED
VISCERAL ARTERIES	CONSTRICTED
PUPIL OF EYE	DILATED
TEAR GLANDS	TEARS SECRETED
SWEAT GLANDS	SWEAT SECRETED
HAIR ON SKIN	ERECT
ADRENAL GLANDS	ADRENALIN SECRETED
LIVER	SUGAR RELEASED INTO BLOOD
SALIVARY GLANDS	SALIVATION STOPPED
STOMACH	CONTRACTION AND SECRETION STOPPED
INTESTINES	CONTRACTION AND SECRETION STOPPED

These physiological reactions produce certain symptoms which assist in the recognition of fear in ourselves or in others. A leader must be able to recognize these symptoms to enable him to better control his men. A list of such symptoms has been prepared based on a survey conducted by the Army on combat experienced men and is reproduced in Table II. Included are the most commonly reported symptoms and also the frequency with which the symptoms were experienced by the men examined.

Usually - not always - you can look at a man and tell if he is having an intense emotion. If he retreats from the scene with wide open eyes and dilated pupils, face flushed, looking quickly from side to side, he is *probably* afraid. However, as can be seen from the list of bodily reactions to emotion, most of the results of excitation are invisible.

This, plus the fact that the man has learned to control his behavior, sometimes makes it very difficult to properly interpret an attitude.

TABLE II

LIST OF THE SYMPTOMS OF FEAR FELT BY EXPERIENCED COMBAT TROOPS AND THE PERCENTAGE OF MEN QUESTIONED WHO EXPERIENCED EACH PARTICULAR SYMPTOM:

SYMPTOMS	*PER CENT*
VIOLENT POUNDING OF THE HEART	86
SINKING FEELING IN THE STOMACH	75
FEELING SICK IN THE STOMACH	59
TREMBLNG AND SHAKING	56
COLD SWEAT	55
TENSE FEELING IN THE STOMACH	53
FEELING OF WEAKNESS AND FAINTNESS	51
VOMITING	24
LOSING CONTROL OF BOWELS	10
URINATING IN PANTS	10

CAUSES OF FEAR

The best means of eliminating an undesirable condition is, of course, to remove the cause. It is no different with fear. Although there are many things that can be done to control fear, it is best to eliminate the cause whenever possible. It is necessary then, to examine those factors which are most frequently the basic cause of fear. For purposes of discussion, they are divided into six general classes: Physical, physiological, emotional, social, morale, and leadership. (See Table III.)

Notice that a fine line cannot be drawn between the classifications as one specific item may bring about several reactions. For instance, SCARCITY OF FOOD AND WATER is classified as a PHYSICAL CAUSE, however, it

will also bring about HUNGER AND THIRST which is a PHYSIOLOGICAL cause and of course will introduce an element of UNCERTAINTY which is an EMOTIONAL cause.

TABLE III

CLASSIFICATION OF THE CAUSES OF FEAR

1. PHYSICAL:Climate (too hot or too cold); scarcity of food and water; sanitary conditions; scarcity of arms or ammunition; present evidence of death and disaster. All of these conditions are effective because they determine mental states. (The list could be increased indefinitely.)
2. PHYSIOLOGICAL: Hunger; malnutrition; lack of vitamin B 1; thirst; fatigue; sleeplessness or irregular sleeping hours; depression; exhaustion; alcoholic intoxication and its after effects.
3. EMOTIONAL: Danger, real or imaginary; emotional tension; expectant waiting; prolonged waiting; surprise threats to life; use of unexpected weapons; anxiety; uncertainty; insecurity; ignorance of the military situation; isolation, physical or psychological.
4. SOCIAL: Emotional contagion; suggestion; culture factors such as greater emotionality of uneducated men; treachery; the effect of maladjusted men on others.
5. POOR MORALE: Loss of confidence in leaders; lack of discipline; the psychological attitudes that arise from continued retreat, or from a continued defensive; homesickness; boredom.
6. LEADERSHIP: Absence of leaders; loss of a good leader; frequent change in leaders; contradictory commands; loss of confidence in leaders. (The leader can, of course, affect nearly all the other causes of fear and panic, for morale depends on leadership.)

Although not rightfully classified as a cause, it is worthy of note that fear thrives on frustration. It persists and grows when danger impends, especially if there is nothing the fearful man can do to lessen the threat against himself. Action on the other hand, always lessens and may even

abolish fear by resolving or eliminating the cause of frustration. Fear is characterized by a sense of unpleasantness and a desire to escape; a state of mind that activates the sympathetic nervous system and builds up added energy. This excess energy can be expended by overt action such as making an aggressive attack or by doing some other thing that is *important.* For example, a man may forget his fear when he suddenly has a wounded comrade to attend to even though the danger has not been reduced.

UTILITY OF FEAR

The additional energy that is provided by chemical changes in the body, as a result of a fearful emergency, is normally used for escape, not for attack. Fortunately, however, *that energy can be diverted from flight to attack, and thus fear sometimes has a military utility.*

A man who is panic stricken as a result of intense fear, can only think of one thing to do, escape. He will probably run, whether away from the enemy or toward him, is largely a matter of chance. Some heroic acts are of this order—the man "escapes ahead," is blindly aggressive, attacks the enemy mercilessly. His comrades, unaware of the basis of his actions, may be stirred to follow him and what may have been a rout becomes a unified attack.

It is because action is the remedy for fear that courage and fear are so often linked together. A man is afraid —his body is geared for activity—physically he is prepared to do something about the danger that haunts him. Shall it be escape or attack? *Discipline, pride, confidence in leaders, belief in war aims, and a host of other intangible forces press him on toward bravery,* bringing about the unpleasant symptoms usually associated with fear. Thus stimulated, he stumbles into action, finds action good, forces a yell from his dry mouth, and soon is fighting vigorously, his mouth moist again and his fear forgotten. His fear was useful. It provided the energy and training habits steered him into the right kind of activity.

On the other hand, fear does not always disappear in combat because not all combat is active, or because the activity does not require sufficient exertion to abolish the

fear. The Army, upon questioning combat troops as to when they felt the most fear, found that 39 per cent said before battle, 35 per cent said during battle, 16 per cent said after battle, and 10 per cent could not decide.

DISCIPLINE MODIFIES FEAR

Good leadership is sometimes defined as the art of making men think optimistically for as long as a man is thinking optimistically, fear can never dominate his reason.

The natural antidote to fear is discipline. Discipline may almost be defined as the act of looking fear in the face. Discipline in this sense implies self discipline as well as military discipline, for in the final analysis the only really successful form of discipline is that which is self imposed. The individual who lives his life in accordance with a settled plan is much less likely to be haunted with the bogey of fear than the man who is content to live by the hour, who allows his life to drift, and who is unable to organize his work or his leisure.

When obedience to authority has become a habit, when loading, taking aim, and firing has been done so often that performance becomes automatic, then shooting wildly in the heat of battle is not likely to occur. This kind of automatic efficiency or habit within the individual gives him a sense of confidence.

What is true of the individual is no less true in regard to the group. Each individual feels secure in the knowledge that his comrades are constantly by his side and at all times are ready to come to his immediate aid. His identity is merged and his confidence strengthened by the group.

A poorly disciplined Army will exhibit the same type of weakness that is common to a crowd; it is discipline alone that converts a crowd or mob into an army. Whereas a well disciplined army is incapable of being intimidated by the sudden appearance of danger, a poorly disciplined army will react after the fasion of a mob and disperse in wild panic. Just as in a well disciplined unit each individual's confidence is strengthened by that of his comrades, so in a badly disciplined unit each individual's instinct of fear is inflamed by the fear of those around him.

FACTORS IN OVERCOMING FEAR

Action dispels fear. In the suspense before combat when men are ready for action and waiting for the signal to start, fear is at its height, but in most cases, it will disappear when action commences.

This explains why commanders require troops to do a lot of work that appears to be unnecessary. (Work that some rear area soldier sees or hears about and immediately starts screaming, "Stupid officers"; "Caste System".) It also explains why a unit may have a higher percentage of cases of "battle fatigue" in a defensive situation than in a similar offensive situation.

If men who are physically ready for action have to while away the time while waiting for the starting signal, the intelligent leader will improvise some activity for them. Hard work is an excellent preventive measure for fear. Men who have been in battle before sometimes get impatient for action to begin because they realize that apprehension begets fear and that action dispels it.

An airplane pilot who had distinguished himself in action against the enemy, said, when asked whether he was scared during those moments of acute peril: "Why I don't know. There was so much to do I didn't have time to think ."

Knowledge of the situation will often minimize fear. The unfamiliar is always more fearful than the familiar as one cannot even plan how to meet a strange and undefined danger. Men in combat should therefore be told as much about the enemy as possible—where he is likely to be met, in what strength, what kind of weapons he is likely to use, and what tactics he may employ. In intervals of waiting between phases of an operation soldiers should be learning from their leaders more about the terrain between them and the objective, looking at the ground ahead if possible, or at a map or aerial photograph of it. Seasoned troops feel less fear than green troops because they have been through it all before; they know what happens in combat and they know what the enemy is like and how he fights. They also know that you can come through unscratched.

In this same sense consider that, "All old soldiers are liars," (about the things they have seen and done). For this reason it is necessary to protect recruits from combat veterans and their wild tales. For example, one old corporal who had just gone through the fighting at Hurtgen Forest was overheard telling a recruit, "why that was only a skirmish, just wait till you see a real show." Actually it was the hardest fight that the division had ever known. This is the sort of thing that instills fear of things to come or of the unknown in the unseasoned soldier and causes him to think to himself, "Just what is a real fight like—will I be able to stand it when the time comes?"

Another and more far reaching example took place when Army troops moving on to Guadalcanal came in contact with the Marines who were combat veterans of three months. Some of the stories related by the experienced men in this case gave rise to the popular misconception that the Japanese were supermen, a belief which flourished for over a year before it was completely dispelled. One regimental commander, having had combat experience in World War I, recognized this danger and told the unit that he was relieving, "Save your bedtime stories for the newspapers and the magazines and give us the straight dope." The number of cases of "battle fatigue" in his organization was considerably lower than in other units operating in the same area under similar conditions.

The soldier needs factual news about the war and how it is going—even when the news is bad. The informed man, who knows that he can depend on the information that comes to him from his headquarters and his country, is armed against lies and rumors. He can thus fight the battle with the physical enemy without having to fight the fear that is engendered by inadequate or incorrect information. If he knows the facts, he can prepare himself accordingly; whereas, if he is required to guess, he imagines the worst and may become panicky.

Habit diverts fear. Fear is disorganizing. It makes men less alert, takes their attention from more important matters, and causes them to act for inadequate reasons. This is why panics are started. But fortunately, discipline and

training divert mens' actions into the proper channels. Then, in action, the mind clears up as fear disappears. Discipline is the soldier's friend in an emergency—it carries him through when reason and logic fail. (An interesting fact in this connection is that soldiers have reported that they were much more afraid during an air bombing in a city while on furlough than they were on the firing line. The obvious reason being that in battle they habitually knew what action to take.)

Some men yield to fear more readily than others because they are unable to subordinate their emotions to sound judgment. Differences in the emotional stability of individuals depend upon habits and training. It is sometimes thought that certain races are more emotional than others, however, there is no evidence to show that one disiciplined man will not react like any other disiciplined man, regardless of race or background.

Calm behavior lessens fear in others. Both *fear* and *self-possession* are contagious. If a soldier becomes overly emotional or panicky, then he should be removed from the sight of the other men. Conversely, an assumed attitude of calmness by one individual is quickly imitated by others. Assumed calm also curbs fear in the man who assumes it as his pride works in opposition to fear.

A classic example which illustrates the effect of an assumed attitude of calmness concerns General Von Schell, then a company commander in charge of a company which had moved forward into reserve positions during darkness. His company halted for the night under a large shed. When dawn broke he discovered that he was in the center of a large open space about 200 meters from an Austrian artillery battery. He was in such a position that if the Russian artillery started firing at the Austrian battery he and his company would be very near the concentration. A Russian observation balloon could be seen overhead making it extremely hazardous to move from the shed even to cross the open space to a more covered location. His fears were soon confirmed as the Russians opened up on the Austrians. About one out of every four rounds fell short

and burst close by the shed in which his company was sheltered. The men became increasingly nervous. Suddenly a shell landed right in the middle of the company but fortunately failed to explode. Nerves were frayed to the breaking point and Von Schell realized that something had to be done about the situation. Calmly he called for the company barber, sat down in a chair with his back to the front and told the barber to cut his hair. His action produced the desired result. Conversation began, a few jokes were played, several of the men began to play cards, and someone began to sing; no one paid any more attention to the shells, even though two men were killed a short time later by a shell that landed in the vicinity. Calm behavior is obviously a strong antidote for fear.

Humor belittles fear. In moments of stress a joke can often ease a tense situation. The story from World War I concerning American troops who were pinned down by fire from another battalion of their own regiment illustrates this fact. The men were nervous and afraid—almost ready to return fire on their comrades. The captain restored morale in an unintentional but very effective manner.

"Jackson," he called.

"Yes, captain."

"Where are you?"

"Right here, across the road."

"Stand up, so I can see you."

"Captain," Jackson shouted in a quiet spell between bursts of machine-gun fire, "if you want to see me, *you* stand up."

A chuckle ran down the line and order was restored. Commands were given. The men crept out of the zone of fire, reached a wooded area that afforded cover, and then contacted the other battalion to stop the fire.

Companionship reduces fear. Whenever possible, men should be within sight or hearing of other men while engaged in combat. Not bunched together so as to make a good target, of course, but close enough so that each man knows he is not alone and that someone else is undergoing the same dangers. Also, the sight of another man who appears to be calm is reassuring. Roll calls help to remind

men that they are not alone and that each man is a part of a closeknit organization. The "buddy system" is designed to promote this idea; this is the reason for two-man foxholes; this explains why an old soldier is mated with a rookie.

Religious faith ignores fear. The men who believe in God's protection and in immortality may be greatly sustained by their faith in that period of apprehension before battle. They can pray too, and for them, prayer works. Even the man alone in a fox hole does not feel alone if he believes that God is with him. Reports from the fighting fronts show that religious faith is an efficient suppressant for fear.

Unit chaplains can play a great part in the fight against fear. During combat they will probably be most useful around the aid station, helping, quieting, and filling the spiritual needs of the wounded. At all times they can help by moving about among the men, giving personal attention to those who need it, consoling or assisting the men with their problems, and thereby removing some of the causes of anxiety and frustration. (Remember that anxiety and frustration differ from fear only in intensity, and may with the slightest provocation develop into acute fear.)

Knowledge of statistics rejects fear. Even when casualties are heavy, comparatively few men are killed. The chances that any one man will be killed in any single operation is relatively small. In the entire Allied Armies in World War I only one man in nine was killed or died as a result of wounds during four years of fighting. This fact can, when it is fully realized, alleviate the feeling of dread and apprehension that precedes an attack.

Many soldiers fear things other than death. They fear that they will be wounded. They especially fear injuries of the abdomen, eyes, brain, and genitals. Others have specific fears of mental breakdown. If they are shown that the injuries most feared are, in fact, the least common, they will be greatly reassured.

Loyalty overcomes fear. Some men may lack faith in God, but may nevertheless be impelled by a sense of loyalty to comrades, to their unit, or to their leader. All prudent men are afraid in the face of danger. Yet, every emergency, every great danger to a group will reveal many quiet heroes; the higher the morale of the unit, the greater the number of unpretentious heroes.

Physical condition deters fear. Tired, sleepy, or hungry men are more likely to show fear than men in good physical condition. A tired man does not think clearly; he is more susceptible to illogical fears and to belief in rumors than a rested man. The healthy man can control fear; the ill man lacks the energy to combat it.

Faith in a cause ignores fear. Because man's mind is capable of being moved by abstract ideas such as honor, glory, freedom, sympathy, justice, or patriotism, he may be moved to fight for what he believes to be *right*, even though he may be filled with fear at the time. Some men may be moved by the spirit of sacrifice to the extent that they are willing to exert their utmost efforts for their ideals, for an enduring institution, or for a righteous purpose, and in the end, are willing to die for their country.

Knowledge overcomes fear. Most inexperienced soldiers are afraid of being afraid. Fear itself is the great unknown of which they are most apprehensive. They wonder whether they will be able to stand the test. These men are potentially the strong men whose pride will make them brave in spite of fear. They should be told what fear is like, why it comes to all normal men, that it is inevitable because it has a physiological basis, that it is overcome by knowledge and experience, and that it usually disappears in action. Men are helped by bringing their fears into the open. It is good to know that others are afraid too; it is good to know that the enemy is also afraid. When one realizes that fear in combat is natural, highly contagious, and inevitable, but that courage is also contagious, then the toughest part of the battle against fear is won. Armed with this knowledge, each individual will be better equipped to combat fear, both within himself and his subordinates.

GLOSSARY OF TERMS

These terms must be thoroughly mastered in order to effectively follow subsequent portions of the text.

Airborne—Pertaining to or a condition existing when personnel and/or materiel are transported in aerial flight.

Airborne troops are troops who are specially organized, trained, and equipped for movement by air and may operate either by parachute or by air-landing.

Air landed forces—Army Ground Force units not specifically trained and equipped for air transport, but which are modified and briefly trained, and then landed by aircraft on prepared or captured fields.

Air transportability—Pertaining to units and equipment whose characteristics permit movement by types of currently used aircraft with minimum loss of tactical unity and minimum disassembly.

Aft CG limit—The most rearward safe limit of the center of gravity of the aircraft expressed in inches aft of the reference datum.

Aircraft—All references made herein to aircraft apply equally to both powered airplanes and gliders.

Aircraft ready for cargo loading—The condition of the aircraft complete with crew, fuel, and necessary equipment when parked ready for loading. (This condition is influenced by variations in fuel loading for different ranges.)

Allowable cargo load—The maximum cargo load the aircraft will carry and still be within the manufacturer's recommended safety factor.

Desired CG—That point at which a state of true balance may be established which will cause the aircraft to maintain level flight with horizontal stabilizer trim tabs in neutral position and expressed in inches aft of reference datum.

Forward CG limit—The most forward safe limit of the center of gravity of the aircraft expressed in inches aft of the reference datum.

Gross weight—The total weight of both the empty aircraft and useful load.

Lift—All serials operating from all air fields on one mission.

Reference datum—A plane perpendicular to the long axis of the fuselage whose location is determined by design and from which longitudinal measurements are made in inches aft of the reference datum to determine station numbers.

Serial—All aircraft operating in the same lift from one air field on a single mission.

Station numbers—A numerical designation representing inches from the reference datum of a plane perpendicular to the long axis of the fuselage. An index to these numbers is provided by stencilled numerals on or near the fuselage transverse beams.

Task force floor—A segmented platform specially reinforced and equipped with attachments for securing to aircraft floor, used to distribute weight of heavy loads and provide additional tie-down fittings.

Useful load—The total weight of crew, fuel, armament, aircraft accessories, and equipment plus the allowable cargo load.

CHAPTER 3

The Mechanics of Moving Troops by Air

Part I

Instruction in *air transportability* has recently been integrated into the curriculum of The Infantry School for the purpose of orienting officers of all ground arms on the mechanical requirements incident to the movement of a unit by air transport. This instruction does not concern itself with a new or revised tactical doctrine but deals with the airplane only as another means of transport available to the already mobile infantryman.

The movement of troops by air during and immediately following the war, ably demonstrated the ability of well trained troops to adapt themselves to this mode of transportation. Only twenty per cent of General Wingate's troops in Operation Broadway, which effected an air landing in the Burma Jungle far in rear of the Japanese lines, had ever been inside of an airplane before. The 27th Infantry Division which was moved by air from Okinawa to Japan in C-54s, had received no training in moving by air transport prior to emplaning. They were coached by teams from the 11th Airborne Division while actually loading men and equipment.

The fact that some troops successfully accomplished air landing missions with only a minimum amount of prior training, however, does not denote that such training is unnecessary. Conversely, it illustrates that trained troops are capable of rapidly assimilating instruction based on principles which they have already learned *if a cadre of expert instructors and technical advisors are available to assist them.* In both of the forementioned examples, expert assistance and advice was rendered by personnel trained in the mechanics of movement by air transport.

The purpose of this article is to summarize the additional training which must be given to *trained* ground troops to prepare them for transport by air. The article does not concern itself with details of staff planning but considers only the mechanics of training troops to load themselves and their equipment in an airplane. Before proceeding further it is necessary to consult the glossary of terms and to read and assimilate the information contained in figures 11, 12, 13, 14 and 15.

COORDINATION AND LIAISON

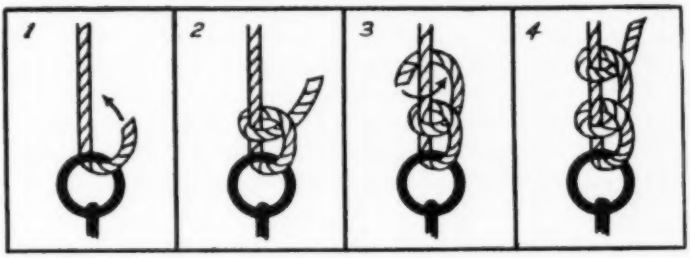
Any operation involving ground force and air force units must be directed and coordinated by a common higher headquarters which issues orders to units of both forces simultaneously. Because of the divided responsibility, it is necessary for each to keep the other informed on all matters pertaining to the move. To further this exchange of information and in order to effect complete coordination, liaison officers are exchanged between the troop carrier unit and the unit to be moved.

The troop carrier units participating in the operation are responsible for *providing the necessary aircraft and air force equipment and for servicing, inspecting, parking, moving, and flying the aircraft provided.* The pilot of each powered aircraft or glider is responsible for inspecting and checking the load of his aircraft for safety prior to take-off and is in full command of the aircraft during flight.

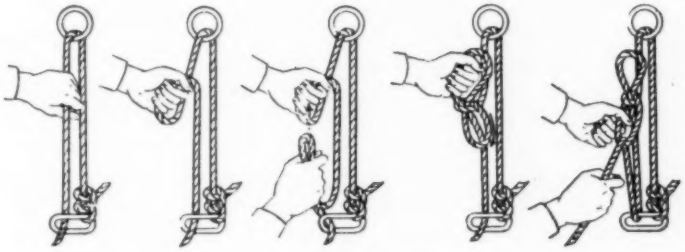
It is the responsibility of the unit being moved *to arrange for the movement of troops and equipment to the departure airdrome, to accomplish the safe loading and lashing of equipment and seating of personnel in the parked aircraft, to prepare and distribute flight manifests, and to unload aircraft at the arrival airfield.*

TRAINING

All personnel of a unit contemplating an air move must be familiar with the cargo-carrying characteristics of cargo aircraft, flight regulations, safety precautions, technique of



TWO HALF HITCHES



BAKER BOWLINE

THE COMPLETED LASHING

FIGURE 11.—Standard knots for lashing equipment to tie-downs.

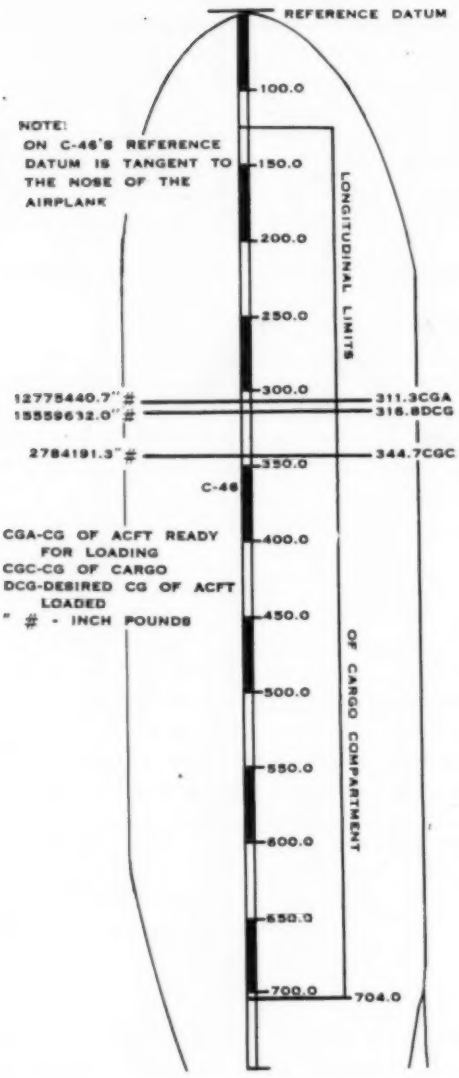

REFERENCE DATUM
100.0
NOTE:
ON C-46'S REFERENCE DATUM IS TANGENT TO THE NOSE OF THE AIRPLANE
150.0
200.0
250.0
300.0
LONGITUDINAL LIMITS
12775440.7" #
311.3CGA
15559632.0" #
316.8DCG
2784191.3" #
344.7CGC
350.0
C-46
CGA-CG OF ACFT READY FOR LOADING
CGC-CG OF CARGO
DCG-DESIRED CG OF ACFT LOADED
" # - INCH POUNDS
400.0
450.0
500.0
550.0
600.0
650.0
700.0
704.0
OF CARGO COMPARTMENT

FIGURE 12.—(Based on Flight Manifest for Plane #1). The product of station number of the *center of gravity* (CG) of any given object multiplied by the weight of that object in pounds is a *moment of force* and is expressed in *inch pounds*. The total inch pounds of the unloaded aircraft and all component parts of the cargo divided by the total weights of the aircraft and the cargo determines the *center of gravity* of the loaded aircraft.

To determine at what point the CG of a load of 8076 must be positioned to maintain the balance of th airplane, the following computations are made based on these considerations:

Wt of C-46 ready for loading for medium range operation .....lbs.—41039
Wt of C-46 loaded with 8076 pounds of cargo .....lbs—49115
CG of C-46 ready for loading for medium range operation .....sta no—311.3
Desired CG of C-46 loaded .....sta no—316.8
Wt of acft loaded × Desired CG— .....49115 × 316.8 = 15559632.0
Wt of acft ready for loading × CG Prior to Loading— .....41039 × 311.3 = 12775440.7

Difference = 2784191.3

By subtraction it is determined that 2784191.3 inch-pounds must be exerted by a cargo weighing 8076 pounds. This figure divided by the weight of the cargo determines the station number of the CG of the cargo.

$$2784191.3 \div 8076 = 344.7$$

Note: All heavy cargo must be positioned between stations 210 and 501.

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loading and lashing, and computation of loads. A technical training program encompassing the following subjects is considered a minimum prerequisite to a successful operation.

1. *Knots and lashings.* Lashings are employed to prevent movement of cargo during flight and may be prepared of rope, cable, or other pliable material. Commercial tie-down expedients may also be used. All lashings must be sufficiently strong to sustain a sudden thrust equivalent to the expected thrust multiplied by the weight of the load. When rope is used for lashings, the tie-down is prepared by tying the rope to the tie-down ring by means of two half hitches. The lashing is tightened by using the baker bowline and secured by a half hitch or a slippery half hitch (see figure 11). A knowledge of the application of these basic knots is essential for each member of a loading team. This knowledge may be gained in one hour of practical work.

2. *Computations of loads and lashings.* All loads must be properly positioned in an aircraft to maintain stability in flight. Personnel of the unit loading the aircraft are concerned principally with longitudinal balance as lateral balance is maintained by centering the loads equidistant from the sides of the aircraft. The factor affecting longitudinal stability is the distribution of loads about the desired center of gravity. The initial computation involving load placement is made to determine the center of gravity of the cargo in relation to the desired center of gravity of the aircraft (see figure 12). After this computation is made, all loads are distributed so as to maintain the equilibrium of the cargo with relation to the center of gravity of the cargo by employing the weight-distance formula (weight in pounds $\times$ distance in inches = force in inch-pounds) (see figures 13 and 14). The center of gravity of the loaded aircraft is determined as explained in figure 12.

In computing necessary strength of lashings, the expected thrust in any given direction multiplied by the weight of the load determines the required tensile strength of the lashing. The following are basic safety factors used in making computations for lashings to sustain thrusts created by flight conditions:

Expected forward thrust = 4.0 times weight of load.
Expected lateral thrust = 1.5 times weight of load.
Expected upward thrust = 2.25 times weight of load.
Expected rearward thrust = 1.0 times weight of load.

When the expected thrust is greater than the ultimate load capacity of the tie-down attachment at which the lashing terminates and/or the tensile strength of the lashing material, additional tie-downs must be utilized in order that the sum of the capacities of all tie-down attachments and all lashings utilized are at least equivalent to the expected thrust.

Horizontal and vertical strengths of lashings are determined by multiplying the pounds per inch capacity of the lashing material (tensile strength divided by length from

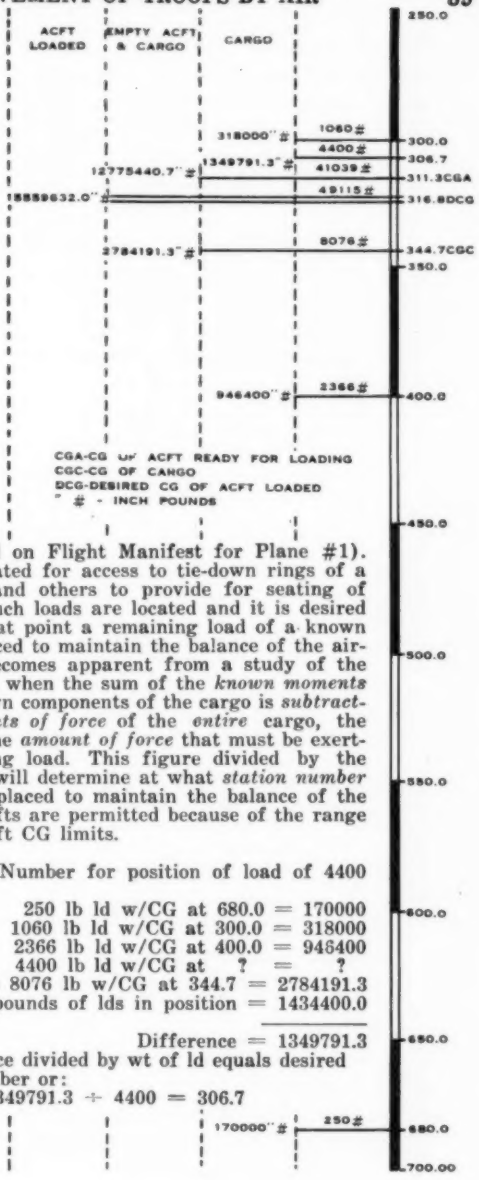


FIGURE 13.—(Based on Flight Manifest for Plane #1). Some loads are located for access to tie-down rings of a required capacity and others to provide for seating of personnel. When such loads are located and it is desired to determine at what point a remaining load of a known weight must be placed to maintain the balance of the aircraft, it at once becomes apparent from a study of the above diagram that when the sum of the *known moments of force* of the known components of the cargo is *subtracted* from the *moments of force* of the *entire* cargo, the *resulting value* is the *amount of force* that must be exerted by the remaining load. This figure divided by the weight of the load will determine at what *station number* that load must be placed to maintain the balance of the aircraft. Minor shifts are permitted because of the range between fore and aft CG limits.

Example:

Determine Station Number for position of load of 4400 pounds.

250 lb ld w/CG at 680.0 = 170000
1060 lb ld w/CG at 300.0 = 318000
2366 lb ld w/CG at 400.0 = 946400
4400 lb ld w/CG at ? = ?
Total cargo 8076 lb w/CG at 344.7 = 2784191.3
Total inch-pounds of lds in position = 1434400.0

Difference = 1349791.3

Desired force divided by wt of ld equals desired station number or:

1349791.3 ÷ 4400 = 306.7

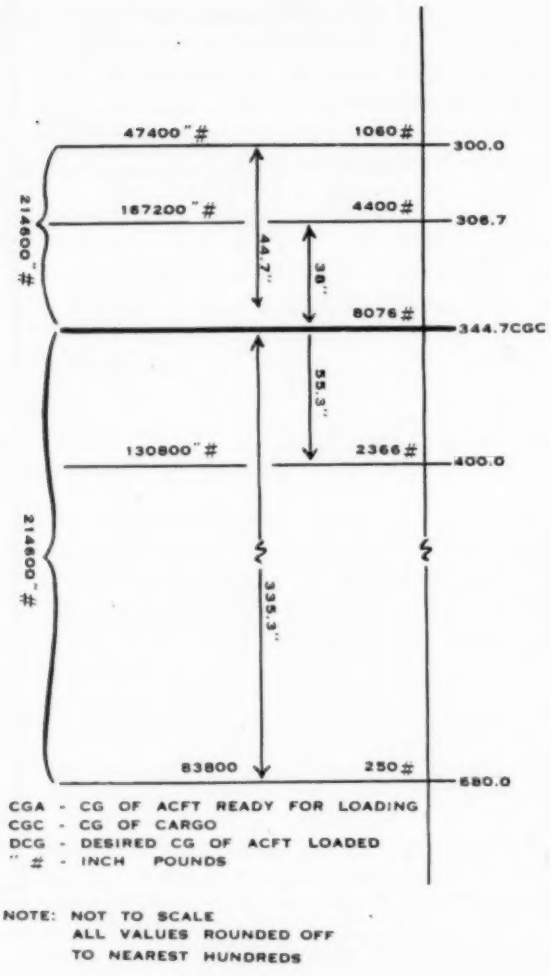


FIGURE 14.—Components parts of a cargo may be properly positioned to maintain a condition of balance when the weights of all components are known by using the weight-distance formula. The condition of balance is obtained when all moments of force forward of the CG of the load equals the moments of force aft of the CG. (CG of the load was determined by method illustrated in Figure 11.)

floor of aircraft to point of tangency with load) times horizontal or vertical distance respectively (see figure 15). All lashings should be made at an angle of 30° to 45° to the direction of expected thrust.

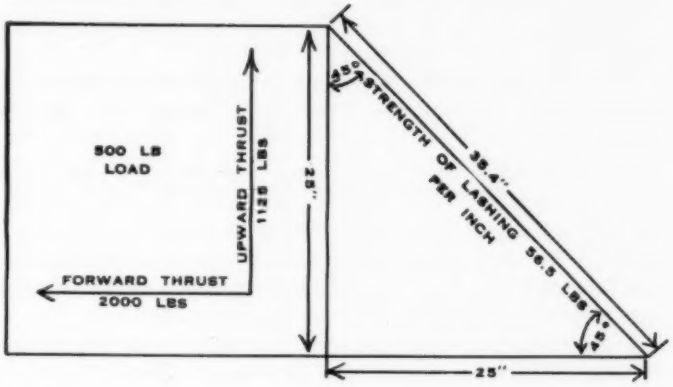


FIGURE 15.—A rope having a tensile strength of 2000 pounds is applied at 45° to the floor of an aircraft to a load weighing 500 pounds. Lashings placed at an angle retard motion in more than one direction. This lashing resists both forward and upward movement.

The rope used is capable of bearing a load of 56.5 pounds per inch (tensile strength in pounds—length in inches or 2000—35.4) and of sustaining a thrust of 1412 pounds when applied at an angle of 45° to the direction of thrust pounds per inch × horizontal or vertical distance in inches or 56.5 × 25). In this case both the horizontal distance, used for computing forward thrust, and vertical distance, used in computing upward thrust, are the same.

Since upward thrust is expected to be 2.25 times the weight of the load or 1125 pounds and the lashing will sustain a thrust of 1412 pounds, the lashing is considered adequate to prevent upward motion. But since the forward thrust is expected to be 4.0 times the weight of the load or 2000 pounds and the lashing will sustain a thrust of only 1412 pounds, additional lashings must be prepared to prevent forward motion.

If the lashing terminates at a tie-down attachment whose ultimate strength is less than 2000 pounds, the additional lashing must not terminate at the same tie-down ring already in use.

Although all personnel need not be able to compute loads and lashings, it is desirable that at least one hour of instruction be devoted to the theory of weight and balance. Officers and noncommissioned officers in charge of loading should receive three additional hours of instruction.

3. *Parachutes, safety devices, and emergency procedures.* All personnel should be familiar with bail-out technique, operation of emergency type parachutes, location and operation of exits and safety devices, use of safety belts, safety precautions, flight discipline, and emergency procedures.

Reference material for instruction in these subjects is contained in TM 71-210 and TF 1-3385.

One hour of instruction is sufficient for orientation but if time is available, emergency drills should also be conducted.

4. *Orientation and aircraft inspection.* The degree of proficiency attained by air transported troops is dependent upon familiarity with the location and types of tie-down fittings, location and use of snatch blocks and winches, and use of task-force flooring and loading ramps in the aircraft used for the movement.

Inspections to determine serviceability of equipment must be conducted prior to the time of loading. The scope of instruction for both of these subjects being similar, they are combined and one hour of instruction for all personnel is required.

5. *Loading and lashing.* Instructional mock-ups are not an item of issue but may be constructed locally. Dimensions of the cargo door, floor, and loading ramps; location of tie-down fittings; and distance of floor from ground should be accurately reproduced in mock-up planes.

Practical work in loading and lashing of equipment is conducted on mock-ups for sixteen hours to develop the necessary proficiency.

Practical work in loading and lashing, using actual aircraft, is continued for four additional hours.

6. *Orientation flights.* Orientation flights are not always feasible and may be dispensed with entirely. At least one flight, however, is recommended.

7. *Rehearsal.* Prior to embarking upon an operation, it is desirable that a rehearsal of the following phases of the operation be conducted:

a. Movement of troops and equipment to departure air field.

b. Loading of all aircraft.

c. Practice flight (not in lieu of orientation flight).

d. Unloading of aircraft.

When nonavailability of aircraft prevents a full scale rehearsal, it is recommended that each aircraft load be loaded, lashed, test flown, and unloaded by the troops who will be required to perform these functions on the operation. Although a test flight is not absolutely essential to a successful operation, the test loading of each aircraft and careful computation of cargo weight and aircraft center of gravity after loading is essential.

War Department Technical Manual 71-210, dated 30 April 1945, contains information relative to cargo-carrying characteristics of most currently used cargo aircraft, instructions for computing the center of gravity and required strength of lashings and loading procedures for typical loads, and items of organic equipment. Weights and measurements of other materiel are contained in Field Manual 101-10. These are the only texts necessary for conducting a complete technical training program.

Upon completion of the training program outlined in the preceding numbered paragraphs, a unit may be considered sufficiently trained to execute a move sucessfully. Prior to the rehearsal preceding the move, however, a detailed plan must be prepared based upon a particular type of operation. Since it is obviously impractical to prepare complete plans for all possible contingencies in advance of receipt of orders, an operation plan supported by a loading plan must be completed before loading can begin (Annex 2). A loading plan determines what personnel and equipment shall be loaded into each aircraft and is controlled directly by the mission, length of flight, and cargo-carrying capacity of available aircraft. Each aircraft load is entered on a flight manifest (Annex 3), and checked by both the aircraft pilot and the individual responsible for loading prior to take-off.

PRIOR PLANNING

It is desirable to have a workable plan prepared which can be adapted to several types of operations requiring movement of troops by air. Any such plan, however, must be sufficiently flexible to permit modification of loads due to changes in number and types of aircraft available. A typical Standing Operating Procedure for an Infantry Rifle Company organized under T O/E 7-17, June 1945, in preparation for an operation to suppress a domestic disturbance is reproduced in Part II. A model loading plan for the company is reproduced as Annex 2. In preparing such a loading plan the following tactical principles are observed:

1. The mission to be performed and anticipated conditions at the destination dictate what personnel and equipment loads must be air-transported and in what order they are to arrive.

2. Personnel and equipment loaded in the leading aircraft should be limited to personnel necessary to perform the initial tasks.

3. Personnel included with a cargo load should be the personnel who will use the equipment on arrival.

4. Insofar as is practicable, tactical unity should be maintained.

5. Key personnel and critical equipment should be dispersed throughout the serial.

6. Each load of personnel and equipment should be temporarily self-sufficient in the event of isolation.

7. Only that equipment which is rendered air-transportable without extensive disassembly should be moved by air.

8. A minimum number of cargo aircraft consistent with the mission assigned, should be employed.

9. All wheeled vehicles should be loaded to capacity with essential combat equipment and supplies.

10. With each vehicle and armament load, a quantity of fuel or ammunition for that equipment should be loaded.

11. Guns, trailers, and other towed equipment should be loaded with their prime movers.

In addition to the tactical considerations enumerated, the following administrative principles must be observed:

1. The number of personnel and amount of equipment that may be air-transported in any one lift is limited by the weight of men and equipment to be moved and the number and capacity of aircraft available.

2. Each load must be balanced about the flyable center of gravity of the aircraft. (See figure 12.)

3. Each component part of the cargo must be securely lashed in place to prevent shifting in flight or dislodging upon landing.

4. Sufficient personnel should be loaded in each aircraft to perform the unloading operation. When especially heavy or bulky equipment is loaded to the exclusion of personnel, provisions must be made for unloading at the arrival airfield.

5. Safety factors for preparing lashings to sustain possible thrust in both the horizontal and vertical planes must be observed.

6. Termination of lashings must be made at one or more tie-down attachments whose load capacities equal that of the expected load based on the expected thrust of the load.

7. The location of the tie-down fittings utilized should be such that lashing may be applied at an angle between the limits of 30° and 45° to the direction of expected thrust.

8. Access to emergency equipment and exits must not be denied.

9. All personnel must be seated and provided with safety belts and parachutes.

10. Convenience and speed in the process of loading are secondary to convenience and speed in unloading.

11. Ramps are located and lashed to expedite unloading.

12. Task-force flooring or boards are used to distribute the weight of loads which are concentrated at one or more points to the extent that unsafe stress would be exerted upon the aircraft floor.

13. The center of gravity of a group of personnel or a bulk load is considered to be at the center of the mass.

14. All personnel and equipment loaded in an aircraft must be listed on a flight manifest and the computations of weights, moments of force, and center of gravity of the loaded aircraft must be checked by both the pilot of the aircraft and the individual in charge of the load.

Upon receipt of a movement warning order, the unit commander immediately becomes concerned with certain details which have a direct influence on his preparations for loading. They are enumerated below in chronological order:

1. Information must be furnished as to number and types of aircraft to be used and what percentage of the command and equipment is to be moved in each serial.

2. Information relative to location and identifying numbers of aircraft to be used must be conveyed to loading units by means of an Aircraft Parking Plan. (The Aircraft Parking Plan, a responsibility of the troop carrier commander, consists of a diagram of the loading area and indicates the relative positions and numbers of all aircraft to be employed.) Specific assignments of aircraft are made in the Air Movement Table which is prepared jointly by the unit to be moved and the troop carrier unit.

3. Prior to loading, information is disseminated to all units of both air and ground forces as to the time aircraft are to be parked and made available for loading, time for stations, and time of take-off. Time for take-off is determined by the troop carrier commander by deducting flying time from the time prescribed for arrival at destination. Time for stations (time when all personnel are to be completely loaded and positioned at proper station numbers) is also determined by the troop carrier commander by further deducting necessary time for engine warm-up and taxiing from take-off time. Time for loading to begin is determined by the commander of the unit to be moved by deducting the time required for loading from the station time.

CONCLUSION

Wartime experience has indicated that an entire infantry division can be taught the necessary procedures outlined above by experienced airborne personnel in less than three weeks time. Such a hasty training program, however, depends on the availability of cargo craft for training purposes, cadres of experienced instructors, and mock-up aircraft as well as the status of training of the troops to undergo instruction.

PART II

The following Standing Operating Procedure is used for instructonal purposes at The Infantry School. The rifle company involved is organized and equipped under TO/E 7-17, 1 June 1945. Although this SOP pertains to a specific situation, it can easily be modified to apply to any situation wherein a rifle company is required to move by air transport. Annexes to the SOP show (1) equipment to be carried by the individual and equipment to be transported by the overland echelon, (2) personnel and equipment to constitute the overland element and the personnel and cargo load of each separate airplane, and (3) a copy of a flight manifest for plane number 1 and the computation of data for all other planes in the serial.

STANDING OPERATING PROCEDURE
AIR MOVEMENT PLAN "A"
for
SUPPRESSION OF CIVIL DISTURBANCE

Company A, 1st Infantry
Fort Benning, Georgia
1 January 1947

1.GENERAL. *a. Purpose.* To establish procedures for preparation of this unit for movement by air in the event of civil disturbance.

b. Scope. The provisions contained herein prescribe general and specific duties of individuals of this command, organization and equipment for aerial movement, and plane

loadings and standard Flight Manifests for eight (8) C-46 type aircraft for independent operation. Modifications for operation as an element of a larger unit will be effected as indicated.

c. Application. Plan "A" is based on the capabilities of the C-46 and all computations are made on its weight and balance data. The load for all aircraft except Plane #1 (advance party) is calculated to approximate 9,000 pounds. This plan will be used for all air transported movements up to and including medium range operations (outbound and return flight to departure airfield without refueling). All instructions in conflict with the contents of Plan "A" are hereby superseded and data contained herein will remain in effect until changed by this headquarters.

2. PREPARATION FOR DEPARTURE. *a. Prior to alert.* (1) Prior to departure from this station, all personnel of this unit will be completely and thoroughly instructed in the provisions of FM 19-15 (Domestic Disturbances) as directed by higher headquarters.

(2) In addition to the instruction prescribed in the preceding paragraph, all officers will be thoroughly familiar with applicable portions of other pertinent War Department publications.

(3) In anticipation of orders for movement, a complete file of publications or pertinent extracts therefrom, necessary company records, purchase order forms, and general office supplies for use under such circumstances as this directive contemplates, will be maintained in a compact form prepared for immediate departure.

b. Alert. (1) Upon receipt of alert orders, leave and pass privileges will be suspended.

(2) Platoon leaders will order preparations for inspection of individual equipment promptly upon notification of alert status. Inspection of troops and equipment will be made by platoon leaders under supervision of company commander.

(3) Flight manifests will be prepared in full by senior officer or noncommissioned officer transported in each

plane prior to take-off. Five (5) copies will be prepared for distribution as follows:

1 - Headquarters ordering movement
1 - Company commander
1 - Plane commander
1 - Pilot of aircraft
1 - Base operations officer

(4) As soon as practicable after receipt of alert orders, the company commander will issue instructions, assign special duties, and brief all key personnel on general plan for accomplishment of mission assigned.

3. ORGANIZATION FOR MISSION. *a. General.* For the purpose of organization for suppression of civil disturbances, this unit will be divided into three echelons as follows:

Advance party—Commanded by company commander or company executive officer

Main body—Commanded by company executive officer or company commander

Overland echelon—Commanded by senior member

b. Advance party. Departure of the advance party constituted of personnel transported in Plane #1 will precede that of the main body by as great a time interval as is practicable. Normally the company commander will be in command of the advance party but at his discretion, the company executive officer may be designated as commander.

c. Main body. Plane loads 2 to 8, inclusive, will constitute the main body and will be transported in one aerial serial by such route and formation as the troop carrier commander shall direct. Normally the main body will be commanded by the company executive officer who shall supervise and direct aircraft loading procedures at departure airfield, unloading procedures, and deployment of troops at arrival airfield prior to resumption of command by the company commander.

d. Overland echelon. The overland echelon will be composed of personnel as prescribed in Annex #2-I, commanded

by the senior member thereof, and will be transported by government motor vehicle.

4. DUTIES. *a. Company commander:*

(1) Is responsible for accomplishment of mission assigned when company operates independently.

(2) Disseminates essential details of general plan of operation at scene of the disturbance.

(3) Assigns specific duties to individuals.

(4) Arranges for attachment of ineffective personnel to other units.

(5) Arranges for attachment of supplementary personnel from other organizations.

(6) Arranges for barracks guard during absence of unit.

(7) Arranges for necessary rations, ammunition, equipment, and transportation.

(8) Supervises inspection of personnel and equipment.

(9) Establishes liaison with troop carrier unit.

b. Company executive officer:

(1) Accomplishes foregoing duties of company commander upon assumption of command.

(2) Organizes unit into its three echelons.

(3) Supervises drawing and issue of rations, ammunition, and equipment not in the possession of personnel.

(4) Assigns attached personnel.

(5) Supervises loading of aircraft.

(6) Posts barracks guard composed of sick-in-quarters personnel and necessary attachments.

(7) Deploys personnel at arrival airfield.

c. Commander, advance party:

(1) Makes contact with civil or military authorities at destination.

(2) Familiarizes himself completely with local situation.

(3) Arranges for billets for all personnel.

(4) Arranges for local purchase of rations and supplies.

(5) Solicits the cooperation of local law enforcement authorities.

(6) Establishes amiable relations with local radio and press.

d. Plane commander: (senior member of each airplane)

(1) Together with crew chief, verifies that his plane is ready for loading.

(2) Directs the loading of the airplane to which assigned.

(3) Inspects all lashings and checks position of component parts of load prior to take-off.

(4) Executes certificate of verification of computations and center of gravity of airplane on flight manifest upon completion of inspection load.

(5) Enforces all flight regulations.

(6) Directs unloading of airplane upon arrival at destination.

(7) Provides local security for personnel and aircraft during unloading procedure.

e. Liaison officer: (to troop carrier unit)

(1) Reports to commander of troop carrier unit when ordered.

(2) Arranges for required number and types of aircraft when available.

(3) Notifies company commander of changes in number and of types of aircraft.

(4) Inspects each airplane for serviceable tie-down rings and loading ramps, arranges for task force flooring and loading ramps when required, and provides for adequate lashings and chocks.

(5) Secures copy of aircraft parking plan.

(6) Notifies company commander when planes will be spotted for loading.

(7) Directs loading, inspects load, and executes certificate on flight manifest for Plane #1.

(8) Acts as guide for company to loading area.

(9) Collects two copies of flight manifest from each plane commander prior to take-off, delivers one to base operations officer and retains one for the company commander.

(10) Acts as plane commander for and departs with Plane #8.

5. PERSONNEL. *a.* Personnel on leave, pass, sick in quarters, or hospitalized will be attached to other organizations.

b. Since it is contemplated that this unit will depart at full T/O strength, all shortages in personnel will be filled with attachments from other organizations and supplementary personnel will be provided by higher headquarters.

6. INTELLIGENCE. *a.* The destination of the organization will remain undisclosed until take-off time.

b. The commander of the advance party will, immediately upon arrival at the scene of the disturbance, completely acquaint himself with all available information pertinent to the situation.

7. OPERATIONS. *a.* Upon arrival of the company at the scene of the disorder, the entire command will be thoroughly oriented as to the specific plan of the company commander for the restoration of law and order in compliance with instructions issued by higher headquarters.

b. Maximum use will be made of civil authorities for routine guard and patrol duties.

c. Each of the four platoons will be provided with one ¼-ton vehicle with trailer.

d. One additional ¼-ton vehicle with trailer and battery-powered public address system will be provided the company commander.

e. All contacts with civilian personnel will be firm and impartial. Unnecessary force will not be used.

f. All personnel will be armed and will not leave billeting area except in line of duty. Full combat equipment to be worn at all times when on duty.

g. Lethal weapons or chemicals will be used only on order of a commissioned officer. Live fire will not be used to create fear; when employed, full benefit will be taken of its destructive effect.

8. LOGISTICS. *a.* This organization will be prepared to operate, independent of outside sources of supply (except for water), for a period of three days. Local procurement of rations will be attempted as substitution for field ration.

b. In addition to items of organization and normal individual equipment, the following items will be requisitioned for delivery prior to time for loading to begin:

(1) Class I:

10-in-1 Ration — 2 days supply per individual
K Ration — 1 per individual carried on person
C, D, or K Ration — ⅓ per individual in advance party and overland echelon for each meal when not with organization.

(2) Class II:

12 Shotguns — 1 for each member of one rifle squad.
1—Public Address System, PA-5, with two speakers.
1—¼-ton truck — command vehicle.
1—¼-ton trailer — For PA system.
4—2½-ton trucks — To transport equipment and personnel of overland echelon.
1—1-ton trailer — To transport motor fuel for overland echelon.

(3) Class III:

.30 caliber ammunition (rifle) - 7 cases
.30 caliber ammunition (LMG) - 8 cases
.30 caliber ammunition (AR) - 2 cases
60-mm mortar ammunition - 12 cases (70% smoke, 30% HE)
57-mm rifle ammunition - 6 cases (50% smoke, 25% HE, 25% AP)
2.36-inch rocket ammunition - 2 cases (50% smoke, 50% HE)
Grenades, hand, irritant - 5 cases
Grenades, hand, smoke - 5 cases
Shell, 12 Gauge - 1 case

(Note: The above ammunition is transported as air cargo and does not include ammunition carried on the individual or that transported by overland echelon.)

(4) Class IV:

Gasoline - 50 gallons
Motor oil - 2 gallons
Grease and lubricants - 2 pounds
(Note: The above motor fuel requirements, transported as air cargo, are based on 200 miles of travel per ¼-ton vehicle. This does not include vehicle tank capacity.)

c. Sick and wounded members of this organization will, when possible, be committed only to military hospitals. When such hospitalization is not practicable, however, civilian hospitals will be used. Transfer to military hospitals will be effected when health of the individual permits. First aid will be rendered by attached military personnel.

9. COMMUNICATIONS AND COMMAND. *a.* The company command post will normally be located in the same building or area in which the troops are quartered. The exact location will be reported to the headquarters ordering the operation.

b. Fullest use will be made of available local communication facilities in maintaining contact with home station and in maintaining contact with cooperating agencies.

c. Local radio and press will be utilized in issuing directives to the civilian population.

d. For use in making direct appeals to disorderly groups, public address systems will be utilized.

e. Contact with and between patrols and outpost will be maintained by normal company radio and wire facilities.

10. QUARTERS. To indicate the non-partisan status of troops employed, only public buildings or areas will be used for troop billets. Tents will be utilized for headquarters, supply, and quartering when public buildings are not available.

STANDING OPERATING PROCEDURE
AIR MOVEMENT PLAN "A"

ANNEX 1
INDIVIDUAL CLOTHING AND EQUIPMENT

1. UNIFORM AND EQUIPMENT:
   Class "A" uniform
   Combat boots
   Steel helmet
   Full field pack
   Weapon (bayonet for rifle)
   Ammunition (also ammunition for ammunition bearers of crew-served weapons)
   Cartridge belt
   First-aid packet
   Canteen and cup
   Binoculars) Carried by
   Compass) prescribed
   Communication equipment) personnel
2. DUFFLE BAG: (transported by overland echelon)
   1 Towel, bath
   1 Uniform
   2 Pairs socks
   4 Suits underwear
   1 Pair combat boots
   2 Handkerchiefs
   1 Blanket (in addition to 1 in pack)
   Personal effects
   (Note: This equipment to be tagged with name, rank, organization, and serial number.)
3. BARRACKS BAG: (Stored in company supply)
   All other clothing, equipment, and personal effects.
4. SPECIAL:
   a. Unless otherwise directed, .50 caliber machine guns will not be transported on an operation.
   b. Shotguns will be issued to designated personnel.
   c. Tear gas, irritants, and all other chemical agents will be transported as cargo and will be issued to individuals only on order of the company commander.

STANDING OPERATING PROCEDURE
AIR MOVEMENT PLAN "A"

ANNEX 2-A
LOADING PLAN
PLANE #1

PERSONNEL LOADED:

Company commander (or executive officer)	1	
Platoon guide, each rifle platoon	3	
Platoon sergeant, weapons platoon	1	
Communications sergeant	1	
Armorer-artificer	1	
Medical technician (attached)	1	
Driver (attached)	1	
Company clerk	1	
Messenger	1	
Basics	9	
Total personnel	20	
WEIGHT OF PERSONNEL (Computed at 220 pounds per person)*		4400

EQUIPMENT LOADED:

1—¼-ton truck (stripped)	2366	
1—¼-ton trailer	560	
(Loaded with:)		
4 Cases 10-in-1 ration	196	
1 Field desk and office supplies	67	
1 Typewriter	37	
4 5-gallon cans of water	200	
1 PA-5 (battery powered) with 2 speakers	250	
WEIGHT OF EQUIPMENT		3676
TOTAL LOAD		8076

*Computation of 220 pounds includes weight of the individual, ammunition, weapons, and equipment carried.

ANNEX 2-B
PLANE #2

PERSONNEL LOADED:

Executive officer (or company commander)	1	
1st sergeant	1	
Supply sergeant	1	
Radio operator	1	
Medical aid men (attached)	2	
Bugler	1	
Messengers	2	
Driver (from weapons platoon)	1	
Basics	5	
Total personnel	15	
WEIGHT OF PERSONNEL		3300

EQUIPMENT LOADED:

1—¼-ton truck (stripped)	2366	
1—¼-ton trailer	560	
(Loaded with:)		
3 Cases 10-in-1 ration	147	
2 Cases .30 caliber rifle ammunition	206	
3 5-gallon cans of water	150	
8 Cases 10-in-1 ration	392	
1 Bulk load (ammunition):		
4 Cases LMG Ammunition	308	
6 Cases 60-mm mortar ammunition	624	
2 Cases .30 caliber AR ammunition	226	
5 Cases grenade, hand, irritant (CM-DM)	260	
5 Cases grenade, hand, smoke	365	
1 Case shells, shotgun, 12 gauge	120	
WEIGHT OF EQUIPMENT		5724
TOTAL LOAD		9024

ANNEX 2-C
PLANE #3

PERSONNEL LOADED: (first platoon less platoon guide)		
Platoon leader, first platoon	1	
Platoon sergeant, first platoon	1	
Messengers, first platoon	2	
Rifle squad, first platoon	12	
Rifle squad, first platoon	12	
Rifle squad, first platoon	12	
Total Personnel	40	
WEIGHT OF PERSONNEL		8800
EQUIPMENT LOADED:		
4 5-gallon cans of water	200	
WEIGHT OF EQUIPMENT		200
TOTAL LOAD		9000

ANNEX 2-D
PLANE #4

PERSONNEL LOADED: (second platoon less platoon guide)		
Platoon leader, second platoon	1	
Platoon sergeant, second platoon	1	
Messengers, second platoon	2	
Rifle squad, second platoon	12	
Rifle squad, second platoon	12	
Rifle squad, second platoon	12	
Total Personnel	40	
WEIGHT OF PERSONNEL		8800
EQUIPMENT LOADED:		
4 5-gallon cans of water	200	
WEIGHT OF EQUIPMENT		200
TOTAL LOAD		9000

ANNEX 2-E
PLANE#5

PERSONNEL LOADED: (third platoon less platoon guide)		
Platoon leader. third platoon	1	
Platoon sergeant, third platoon	1	
Messengers, third platoon	2	
Rifle squad, third platoon	12	
Rifle squad, third platoon	12	
Rifle squad, third platoon	12	
Total personnel	40	
WEIGHT OF PERSONNEL		8800
EQUIPMENT LOADED:		
4 5-gallon cans of water	200	
WEIGHT OF EQUIPMENT		200
TOTAL LOAD		9000

ANNEX 2-F
PLANE #6

PERSONNEL LOADED:		
Platoon leader, weapons platoon	1	
Messengers, weapons platoon	2	
Driver, weapons platoon	1	
Section leader, special weapons section	1	
Messenger, special weapons section	1	
57-mm rifle squad	5	
57-mm rifle squad	5	
57-mm rifle squad	5	
Total personnel	21	
WEIGHT OF PERSONNEL		4620
EQUIPMENT LOADED:		
1 ¼-ton truck (stripped)	2366	
1 ¼-ton trailer	560	
(Loaded with):		
10 Cases 10-in-1 ration	490	
3 57-mm rifles	135	
3 5-gallon cans of water	150	
6 Cases 57-mm rifle ammunition	450	
8 Cases 10-in-1 ration	392	
WEIGHT OF EQUIPMENT		4543
TOTAL LOAD		9163

ANNEX 2-G
PLANE #7

PERSONNEL LOADED:

Section leader, assault section, weapons platoon	1	
Assault section, weapons platoon	21	
Section leader, LMG section weapons platoon	1	
LMG section, weapons platoon	11	
Total personnel	34	
WEIGHT OF PERSONNEL		7480

EQUIPMENT LOADED:

1 Bulk load (weapons)		
2 LMG's	80	
6 Rocket launchers	57	
1 Bulk load (ammunition)		
2 Cases rifle ammunition	206	
4 Cases LMG ammunition	308	
2 Cases 2.36" rocket ammunition	256	
4 5-gallons cans of water	200	
7 Cases 10-in-1 ration	343	
WEIGHT OF EQUIPMENT		1450
TOTAL LOAD		8930

ANNEX 2-H
PLANE #8

PERSONNEL LOADED:

Executive officer, weapons platoon (liaison officer)	1	
Mortar section leader, weapons platoon	1	
Mortar section, weapons platoon	16	
Driver, weapons platoon	1	
Total personnel	19	
WEIGHT OF PERSONNEL		4180

EQUIPMENT LOADED:

1 ¼-ton truck (stripped)	2366	
1 ¼-ton trailer	560	
(Loaded with):		
3 60-mm mortars	126	
4 Cases 10-in-1 ration	196	
3 5-gallon cans of water	150	
1 Bulk load (motor fuel—200 miles per vehicle)		
10 5-gallon cans of gasoline	400	
2 1-gallon cans of engine oil	20	
2 pounds gear lubricants and miscellaneous grease	2	
1 Bulk load (ammunition)		
3 Cases .30 caliber rifle ammunition	309	
6 Cases 60-mm mortar ammunition	624	
2 Cases 10-in-1 ration	98	
WEIGHT OF EQUIPMENT		4851
TOTAL LOAD		9031

ANNEX 2-I
OVERLAND ECHELON

PERSONNEL TRANSPORTED:

Motor Transport officer (attached)	1
Mess sergeant	1
Cooks	5
Cooks helpers	3
Basics	7
Total personnel	17

EQUIPMENT TRANSPORTED: (In four 2½-ton trucks and one 1-ton trailer)

Ranges
Kitchen utensils
Tentage
"A" bags
Cleaning and preserving material
Ammunition
Motor and range fuel
Miscellaneous cargo

FLIGHT MANIFEST

FOR

~~PARACHUTE JUMP~~ AIR TRANSPORT MVMT ~~GLIDER FLIGHT~~

Plane / Glider No. 1
Pilot C.W. SMITH, LT AC
Tr Comdr G.H. SIMS, CAPT INF

Stick No.[2]
Serial 1
Exit[2]

D Adrm (POINT OF DEPARTURE)
DZ or LZ (DESTINATION)
Date (DATE OF FLIGHT)

PERSONNEL LOADED:

SEAT	NAME AND RANK	ASN	ORG.	REMARKS
1	G.H. SIMS CAPT, INF	032345	CO A 1ST INF	(NOT APPLICABLE
2	D.C. BIRD S/SGT	RA 61547012	"	TO AIR TRANSPORT
3	B.A. BAIR S/SGT	RA 12077553	"	MOVEMENT)
4	S.R. ANDREWS S/SGT	RA 11206854	"	
5	W.R. BETTS T/SGT	RA 16152001	"	
6	H.E. WRIGHT SGT	RA 31419414	"	
7	S.W. SCOTT T/5	RA6019621	"	
8	O.E. WINN T/4	RA 6393281	MED DET 1ST INF	
9	W.D. WISE T/5	RA 5320012	SERV CO 1ST INF	
10	R.A. HOOD T/5	RA 7019059	CO A 1ST INF	
11	T.R. WYATT PFC	RA 6190128	"	
12	J.D. YATES PFC	RA 30218613	"	
13	V.T. ZAR PFC	RA 10016402	"	
14	R.L. PRICE PFC	RA 5469971	"	
15	B.A. HART PFC	RA 9800261	"	
16	F.H. HEDGE PVT	RA 5732001	"	
17	E.R. BLAKELY PVT	RA 8765432	"	
18	S.E. WOLFE PVT	RA 7379201	"	
19	A.L. REAL PVT	RA 6953871	"	
20	B.A. FLYNN PVT	RA 6286902	"	
21				
22				
23				
24				
25				

EQUIPMENT LOADED:

NO.	ITEM	WEIGHT	BACK OR STA. NO.	COMPUTATIONS
1	20 PERSONNEL	4400	306.7	
2	1 ¼-TON TRL (w/lo)	1060	300.0	CG = 316.8 STA. NO.
3	1 ¼-TON TRK	2366	400.0	49115 | 15559632.0
4	1 PA-.5	250	680.0	
5				
6				
7				INSPECTION COMPLETED AND COMPUTATIONS VERIFIED
8				G.H. Sims, Capt Inf
9	WT OF ACFT UNLOADED	40139	311.3	C.W. Smith, 1st Lt AC
		49115		

1. STRIKE OUT INAPPLICABLE TERMS
2. FOR PARACHUTE JUMPS ONLY.

TAGS FORM 33

FIGURE 16.—Flight manifest.

ANNEX 3
FLIGHT MANIFESTS

Insert figure 6 here .....

PLANE NUMBER	ITEM	WEIGHT	STATION NUMBER	COMPUTATIONS
1 (See figure 16)	20 personnel	4400	306.7	
	1 ¼-ton trk	2366	400.0	
	1 ¼-ton tlr (w/ld)	1060	300.0	CG = 316.8 sta no
	1 PA-5	250	680.0	
	Wt of acft unloaded	41039	311.3	49115 / 15559632.0
		49115		
2	15 personnel	3300	374.6	
	8 cases rations	392	170.0	
	1 ¼-ton trk	2366	256.0	CG = 317.0 sta no
	1 bulk ld (am)	1903	365.0	
	1 ¼-ton tlr (w/ld)	1060	450.0	50060 / 15869971
	Wt of acft unloaded	41039	311.3	
		50060		
3, 4 and 5	40 personnel	8800	343.0	
	4 cans water	200	343.0	CG = 317.0 sta no
	Wt of acft unloaded	41039	311.3	
		50039		50039 / 15862363
6	21 personnel	4620	348.9	
	8 cases rations	392	170.0	
	1 ¼-ton trk	2366	256.0	
	1 ¼-ton tlr	1050	450.0	CG = 317.0 sta no
	6 cases am	450	500.0	
	3 57-mm rifles	135	522.0	50202 / 15914034
	3 cans water	150	542.0	
	Wt of acft unloaded	41039	311.3	
		50202		
7	34 personnel	7480	300.0	
	4 cans water	200	341.0	
	8 cases am	770	491.0	
	6 rocket launchers w/am	137	591.0	CG = 317.0 sta no
	7 cases rations	343	653.7	49969 / 15840173
	Wt of acft unloaded	41039	311.3	
		49969		
8	19 personnel	4180	340.0	
	1 bulk ld (mtr fuel)	422	174.0	
	1 ¼-ton trk	2366	256.0	
	2 cases rations	98	350.0	CG = 317.0 sta no
	1 bulk ld (am)	933	544.0	
	1 ¼-ton tlr	1032	450.0	50070 / 15872190
	Wt of acft unloaded	41039	311.3	
		50070		

CHAPTER 4

The Problem of Reorganization

"Seize and hold" is the term which usually precedes the announcement of the objective. It prescribes the essence of the mission and confers the highest responsibility of leadership. The sacrifices expended in seizing the objective are worthless if carelessness or neglect delays prompt reorganization and the unit is unprepared to meet the inevitable counterattack.

Too often in prewar training and maneuvers, the tactical situation ended when the unit finally attained its assigned objective. Perhaps this was only a human reaction since every effort was exerted to gain the objective and any action following immediately thereafter was anticlimax. It took hard-fought battles and easily-lost objectives during this past war to pound home the ignored principles in our Field Manuals. Specific examples are much too familiar to enumerate here but the saying "as you do in training, so will you do in combat" has reminded many a leader that the weakness of reorganization was a carry-over of ignored principles during the training period. It is therefore mandatory that this weak link in the fighting chain be reforged in all future peacetime training and maneuvers so that reorganization on the objective will become a well-defined, immediate, and automatic action and the true climax of the attack.

THE PROBLEM BEGINS

As soon as the leader's hand comes down in the significant command of "Let's Go!", and his outfit crosses the line of departure, his tactical organization begins to strain at the leash of control. As the fire fight progresses, he will

suffer still further loss of control. He cannot be in the immediate vicinity of both the base of fire and maneuver elements, so he must select the position from which he can best influence the success of the action and then depend on subordinate leaders to handle remaining elements. When the fight reaches the assault phase, the efficiency of the final effort is going to depend directly on leadership, previous training, and maybe some guts.

When the objective has been seized, precautions must be taken to hold it for the enemy will usually try to take it right back. Maybe not, but the odds favor the immediate counterattack. Why? The enemy realizes that at the moment of success there will be considerable confusion, relaxing of alertness, straggling, and absence of control. Therefore, at the moment it becomes apparent that the position will be lost, the smart enemy commander will be ready to counterattack immediately with the hope of catching the victor unprepared.

PURPOSE AND METHODS OF REORGANIZATION

To counter such action, the victorious leader must regain maximum control and be prepared to complete the reorganization on the objective to:

1. Be ready to repel a hostile counterattack.
2. Prepare to continue the attack.

Obviously, speed is of prime importance. During the past war reorganization was found to be much too slow. The average company required about twenty to thirty minutes to reorganize but counterattacks were often launched in less than ten. Leaders were soon forced to evolve time saving procedures to accomplish the reorganization in time to meet the immediate enemy reaction. These procedures had to be evolved and rehearsed during rest and retraining periods just as a new football play might be devised to defend against an opponent's tactics. These lessons which were learned (or relearned) in combat, must not be ignored.

The methods or "plays" employed will vary with the size of the unit. The important point is that *each element of the unit must know where to go before it arrives on the objective.*

THE RIFLE SQUAD

The rifle squad is the smallest organization of Infantry and on first consideration, may not seem to present much of a problem because of its limited size. Such a concept is definitely wrong, for the success of prompt reorganization of the platoon, company, and battalion depends directly on the ability of a rifle squad to take up its assigned position with a minimum of confusion.

Considering first, that the rifle squad consists of two elements, a BAR team and a rifle team, the squad leader must next consider the types of formations which the squad will be required to adopt during reorganization. Normally, they will be: (See figure 17.)

1. Line
2. Wedge
3. Perimeter

Since the BAR team is the squad's firepower punch it must receive initial consideration for location in that portion of the squad area which will afford the best field of fire. The rifle element can then cover the remaining area. With this in mind, the squad leader must determine from the terrain where each element is to go and then must include in the order for the attack, thorough instructions covering reorganization on the objective. To insure control, the squad leader should go with one element and assign the other to the assistant squad leader. Minor adjustments of individual positions can and should be made after the squad has taken its assigned area, but to avoid initial confusion, each individual must know approximately where he is expected to go in relation to other men.

THE RIFLE PLATOON

The rifle platoon is the shock element of Infantry and it is at this level that a reorganization *procedure* is in critical demand. The conduct of the reorganization can be an example of precision or it can be an example of hopeless, undisciplined confusion resulting in the loss of an objective

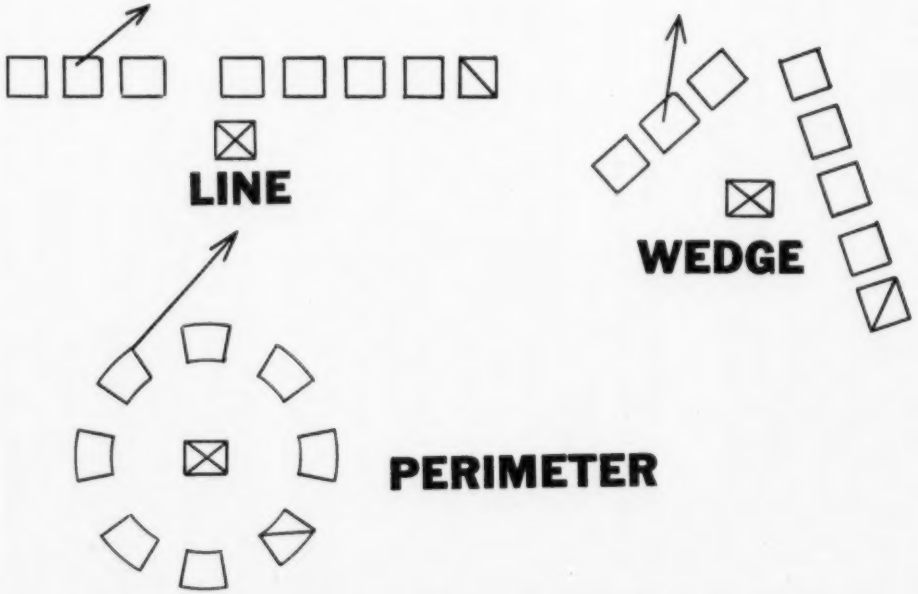


FIGURE 17.—Illustrated above are the formations adopted during reorganization by the rifle squad.

and failure of a mission. The platoon leader must therefore insure the success of the attack by adequate pre-planning and training.

Consideration must be given to the composition and formations of the element. Three rifle squads and a weapons squad (one LMG and one rocket launcher) will normally be deployed in the attack and must be reformed on the objective. In addition, consideration must be given to other elements which may be attached to the platoon. Normally the formations adopted during the reorganization will be: (See figure 18.)

1. Perimeter
2. Vee - two squads forward, one back
3. Wedge - one squad forward, two back
4. Line - three squads forward

It is difficult to designate the formation most likely to be employed, for that will depend largely on the terrain. However, the *method of reorganization adopted should be flexible enough to apply to as many of the more common formations as possible.*

In the past war, jungle operations required habitual adoption of the *perimeter* formation. This formation was popular in open terrain as well, particularly when the objective was captured toward dusk and enemy infiltration was likely. Also commonly used in open terrain was the *vee* formation.

Experiments with several systems of reorganization have been conducted at The Infantry School. Since simplicity of method was the primary requirement in order to obtain maximum possible speed, the clock system for the rifle platoon was selected as the most practical for the most commonly used formations, *perimeter, vee,* and *wedge.*

Basically, the clock system is a method of area designation in which reference is made to terrain features according to their relative positions in a twelve digit circle, similar to a clock, with twelve o'clock being some prominent terrain feature or fixed point on the objective usually in the direction of advance. Squad frontages normally average from fifty to one hundred yards, therefore when a fixed point is

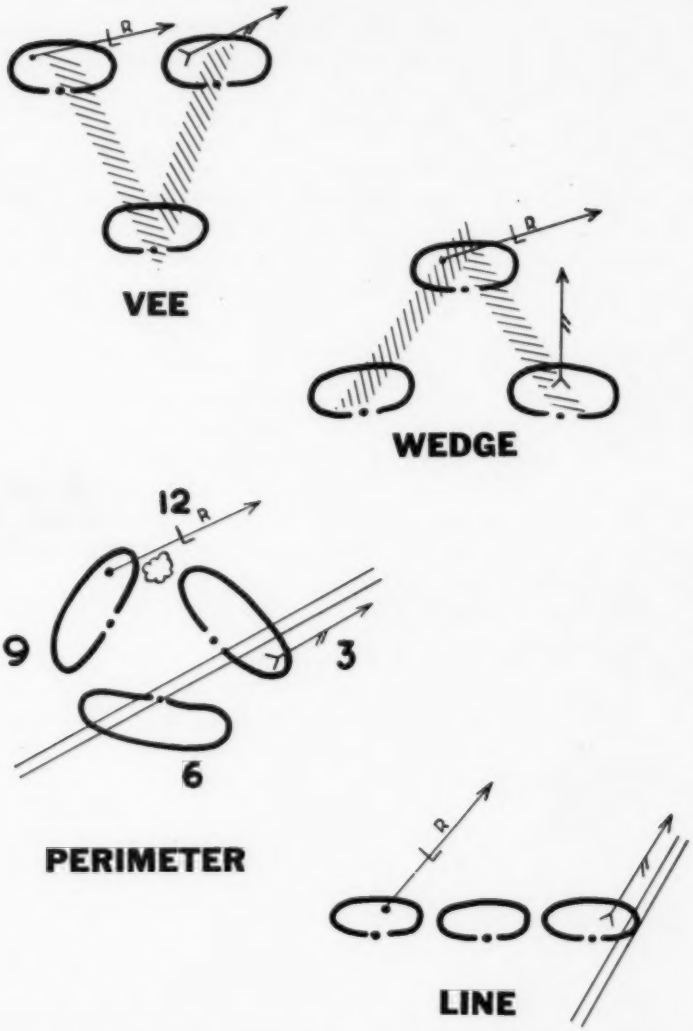


FIGURE 18.—Illustrated above are the formations adopted during reorganization by the rifle platoon. The light machine gun is placed where it can obtain the best field of fire to the front. The rocket launcher covers the most favorable approaches for enemy armor.

SIG 4

designated as twelve o'clock, the leading squads anchor their right and left flanks on this point and extend to the left and right to the limit of their frontage. The remainder of the platoon, the support squad, and elements which constitute the base of fire, will fill in the battle position under direction of the platoon leader, or a designated subordinate, as soon as they arrive on the ojective. The security of the position will depend initially upon the prompt reorganization of the assault rifle squads and finally, upon the rapid reorganization of the entire platoon. (See figure 18.)

As the platoon leader cannot possibly control every element during the actual reorganization, full use must be made of subordinates. Specific tasks should be allotted to these assistants in the platoon attack order to insure the maximum degree of supervision and control.

The key to success of any adopted standard operating procedure is that it be practiced as a drill until every individual is thoroughly familar with the part he is expected to play. The first step in preparing this procedure is to determine chronological tasks and fix responsibility for their accomplishment. The following table indicates the most important phases of preparation for the rifle platoon:

TASK	*RESPONSIBILITY*
Squads Move to Assigned Areas	Squad Leader
Post Security	Squad Leader
BAR Teams Assigned Positions and Sectors of Fire	Squad Leader
Riflemen Assigned Positions and Sectors of Fire	Asst Squad Leader
Weapons Squad Assigned Positions and Sectors of Fire	Platoon Leader Platoon Guide
Replace Key Leaders, Equalize Strengths	Platoon Leader
Redistribute Ammunition	Platoon Sgt
Check Individual Positions, Flanks, and Terrain to Front of Position	All Leaders
Select Positions (OP's) for Best Control	All Leaders
Report Situation to Company Commander	Platoon Leader

Obviously, many of these tasks can be performed concurrently. The checking of positions by all leaders is to be especially noted for it must be realized that the *execution of an order cannot be taken for granted.* The order must be followed by personal supervision to insure that it not only has been carried out but that compliance has also been made with the intent of the order. In other words, assigning Pvt Jones to a position "in that ditch to cover that road" with his grenade launcher does not mean that he can really accomplish anything from that position. It may well be that a slight rise in the ground obscures a field of fire. A personal check by the squad leader will ascertain that Pvt Jones does have a good position, or, if not, that he is moved to one more suitable. A minor detail perhaps, but it is negligence of minute details which may cost lives and nullify the efforts of the entire unit.

The next step is to apply this procedure to the ground by means of a troop leading exercise in order to illustrate the proper method. By walking through and explaining the drill step by step several times, the squads and individuals will gain, by practical application, a more thorough understanding of the procedure. These exercises should be followed by a dress rehearsal in which only the formation and assigned areas are announced in order to test understanding of the procedure and to concentrate on speed. When the conduct of the reorganization by the platoon functions smoothly, then it is time to determine how well subordinates understand the procedure by declaring certain individuals, including some key leaders, casualties. When the BAR is taken from the body of a simulated casualty, ammunition from another rifleman simulated casualty, and Pvt Jones assumes command of his squad after both squad leader and assistant squad leader have been designated casualties, and the reorganization phase is still accomplished with efficiency and speed, then the procedure should be integrated into every attack exercise.

The following is an example of the reorganization part of the platoon leader's attack order, applying the clock system to the perimeter formation:

* * * * * *

"When we reach the objective, that house near the road is twelve o'clock.

First squad, take from 12 to 4 o'clock.

Second squad, take from 8 to 12 o'clock.

Third squad, take from 4 to 8 o'clock.

Weapons squad cover the road from positions about 11 o'clock.

Platoon guide - check weapons and third squad.

Initially, I will be with the first squad."

* * * * * *

This same system of designation of areas is also applied to *vee* and *wedge* formations except that the area of appropriate squad positions is reduced.

THE RIFLE COMPANY

Reorganization after capture of the objective by an assault rifle company involves additional problems because of the number of elements involved. However, the basic considerations are still to prepare to repel hostile counterattack and to prepare to continue the attack. Generally stated, the tasks which immediately confront the company commander are to:

1. Protect the reorganization:

a. Establish local security and, if necessary, employ patrols to maintain contact with the enemy.

b. Protect the front and flanks by assigning sectors of fire to the weapons platoon along likely routes of approach.

c. Prepare tentative fire plans for all available supporting fires.

d. Locate the bulk of the available support element in a position of readiness for prompt action against an enemy counterattack.

2. Coordinate the reorganization of the rifle platoons:

a. Check the organization of positions, formations, and preparations to continue the attack.

b. Equalize strength, replace key leaders.

c. Check the front, flanks, and fields of fire.
d. Redistribute ammunition.

3. Submit situation, strength, and ammunitions reports to the battalion commander.

It is apparent from the number of tasks to be accomplished that in order to conserve all possible time, a standard operating procedure must be adopted. Again speed and efficiency depend upon subordinate elements knowing where they are expected to go upon reaching the objective.

The essential considerations which influence the company SOP are composition of the unit and formations which are likely to be employed. Basically, three rifle platoons, one weapons platoon, and the company headquarters make up the rifle company. The formations normally adopted to deploy these elements in the attack and reorganization are:

1. Vee - two platoons forward, one back.
2. Wedge - one platoon forward, two back.
3. Perimeter.
4. Line - three forward.

On the company level, formations *vee* and *wedge* are most commonly employed except in close terrain or jungle. Consistent with the requirement oi simplicity, the formations should be referred to by short title. For the locations of platoons within the formation, the numbers should refer to the forward platoon(s) from right to left, then the rear platoon(s) from right to left.

Thus, a wordy order in announcing the plan for reorganization upon capture of the objective is reduced to about the following:

* * * * * *

"We will reorganize in formation Vee 1, 3, 2. Left flank that road, right flank that haystack.

Weapons from positions near 2, cover front and watch road for tank and infantry approach."

* * * * * *

Applying the standing operating procedure in accordance with this brief order indicates in detail to each platoon leader that upon reaching the objective, the company formation is two platoons forward and one platoon to the rear

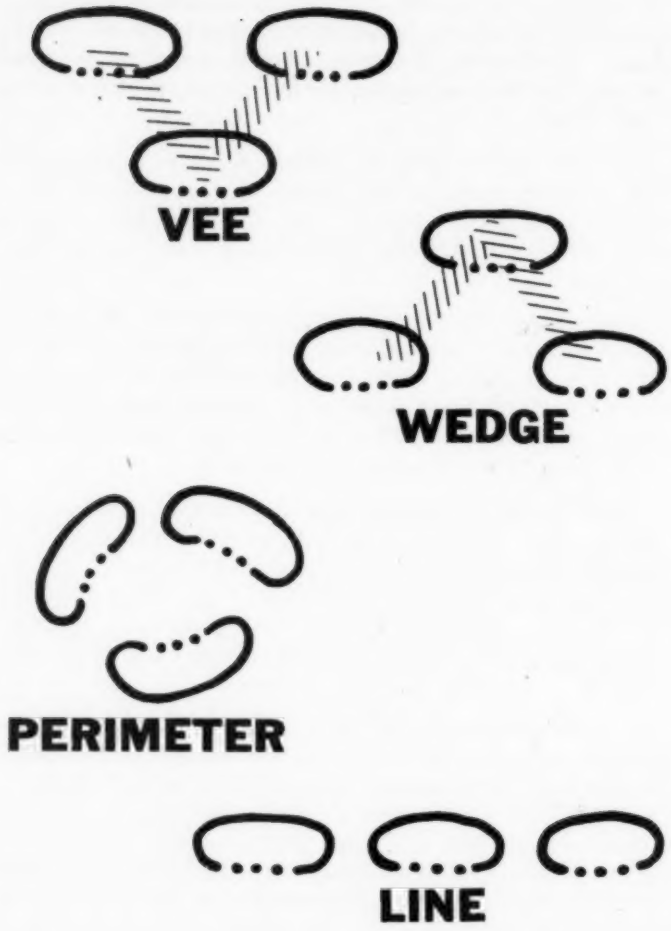


FIGURE 19.—Illustrated above are the formations adopted during reorganization by the rifle company. The 60-mm mortars are located in battery if possible, where they can deliver fires to any threatened portion of the company area. The 57-mm recoilless rifles are located where they can obtain direct fire against profitable enemy targets.

in support. The weapons platoon is located in a position area near the second platoon and in compliance with the assigned missions the 57-mm gun section covers the road sector and the 60-mm mortar section covers the entire company front.

The company commander orders what to do and generally indicates how but the details of execution are determined by the platoon leader. (An example of the procedure normally employed by the platoon leader was discussed previously.)

Note that in the reorganization part of the company order no fixed point or boundary between platoons on the objective is established. In the attack order the frontages and approximate boundaries (if boundaries are used) will normally be announced and unless it is necessary to change them, there is little reason for repetition.

Also, initial assignment of position areas to the weapons platoon must be general in order to permit the exercise of initiative in accomplishing the assigned missions. Designated personnel should closely follow the rifle platoons to the objective to reconnoiter for suitable positions and then meet the weapons sections when they arrive and guide them directly to the selected firing positions.

The adoption of this system reduces last minute detail and permits the commander to personally supervise the administrative and tactical phases of the reorganization in the minimum time. The rifle company is the first unit to arrive on the objective which is composed of a sufficient number of elements organized on an effective tactical scale. Therefore, an efficient *system* of reorganization is necessary on the company level. Indeed, in this past war, after lessons learned were put into practice, there were numerous examples of aggressive rifle companies seizing and holding ground in spite of fierce counterattacks by enemy units of superior strength.

THE BATTALION

The battalion is the basic tactical unit of infantry. While it normally operates as part of a regiment, the battalion contains a sufficient balance of tactical elements to permit detachment for performance of an independent mission.

The considerations affecting reorganization will, in general, be the same as for the subordinate units and elements, particularly the rifle company, previously discussed, but on a higher level and in more detail. Again, the administrative and tactical reorganization must be effected in the minimum time.

At the battalion level a staff is available to assist the commander. Proper use of this staff enables the commander to supervise closely the execution of orders by subordinate commanders and insures adequate preparations for future action.

Subordinate units are normally reinforced with battalion heavy weapons and other attached weapons elements. Security measures are coordinated both as to strength and location. In addition, the battalion commander must take necessary measures to maintain contact with the enemy either by observation posts or patrols. Minimum procedure must also include:

1. Replacement of key leaders.
2. Equalization of tasks in accordance with unit strengths.
3. Equalization of strengths in event of heavy casualties. (Insofar as practicable, integrity of units should be maintained.)
4. Submission of unit status reports.
5. Rendering a report to the regimental commander.

If, because of hostile action or a change in plan, the battalion does not continue the advance, then temporary defensive measures must be taken to include coordination of fires of the heavy weapons company, supporting artillery, tanks, or mortars.

While a great responsibility rests on the shoulders of the battalion commander, proper employment of a reorganization plan which coordinates the SOP's of subordinate

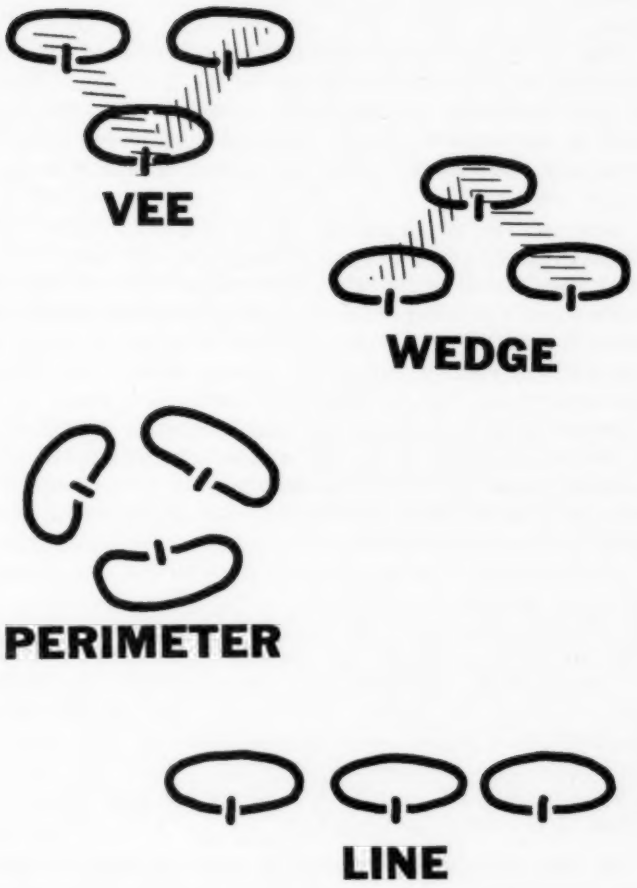


FIGURE 20.—Illustrated above are the formations adopted during reorganization by the infantry battalion. Elements of the heavy weapons company and attached supporting elements are located in the battalion area where they can best support the rifle units.

units, enables the battalion to meet any threat to its newly won position. And most important, time is available for personal supervision to insure the efficient conduct of the plan.

The following is an extract from an example of a battalion plan used by one commander in the European Theatre in this past war. Although this particular example deals with combat in towns, it is evident that only slight modifications are necessary to adapt it to more open terrain.

* * * * *

General. Our plans for the attack of a village cover two phases: the assault and reorganization on the objective.

1. *The Assault plan. a.* Careful observation of the objective and a detailed study of aerial photos are carried out prior to drawing up the plan of attack in order to permit assignment of specific tasks. We always employ the following general principles: Attacking towns on a broad front; crossing the line of departure rapidly and gaining the objective under cover of supporting fires; using assault fire; blocking roads and cutting communication lines immediately; clearing the town thoroughly, and organizing quickly after seizing the objective.

b. Execution. The assault units push all the way through the town beating down the enemy with all available fire on targets and suspected targets. Seizing the objective quickly, they leave the mopping up to support platoons and the reserve company. Catching the enemy between the assault and mopping up groups encourages him to surrender. Rocket launchers and antitank guns are kept well forward and fired into troublesome buildings. White phosphorus grenades are used to drive the enemy out side so we can catch them with small arms fire.

2. *The plan for reorganization.* We carefully pre-plan the composition and formation of the security force to protect reorganization on the objective. The assault companies take up positions on the far edge of town, put out light outposts and, if we remain on the ojective, they dig in. Initial supporting weapons, besides the assault companies organic weapons, are attached heavy machine guns. The 81-mm

mortars and antitank guns displace rapidly behind the assault companies, usually by echelon in order to maintain continuous fire support if it's needed. We fire our mortars in battery; however, one section must always answer priority fire missions from each of the assault companies. That way there is no question as to proper fire when things get tough. It's the same idea that the artillery employs.

With this system we are able to concentrate on the next objective and get a look at the shape of things. Also, we can devote time to planning artillery fires. We usually have at least a platoon of tanks, so we always have a strong mobile reserve and lots of firepower to bolster any part of the position the enemy may try to hit with his inevitable counterattack."

* * * * * *

CONCLUSIONS

1. The rifle squad is the basic element of Infantry which is capable of seizing and occupying an objective. It is the first line element which makes contact with the enemy and *must be prepared to quickly organize captured ground for defense concurrently with preparations for continuing the attack.*

2. The rifle platoon is responsible for the organization of captured ground in its zone in order to defend against hostile counterattack and to prepare to continue the attack. This involves the coordination of tactical locations of squads, security measures, fires, and administrative details. The necessary but time consuming details involved in reorganization *must be accomplished concurrently according to a procedure adopted as a drill and integrated into attack training.*

3. The rifle company is the basic administrative and tactical unit of Infantry and is responsible for organizing captured ground in its zone of action. The tactical and administrative details of reorganization must follow a prearranged procedure designating formations to be adopted and limitations of flanks. Beyond these essentials, *this procedure should require the subordinate elements to accomplish*

reorganization according to their own adopted method. This enables the company commander to coordinate the actions of subordinate and supporting elements and to personally supervise the execution of orders.

4. The battalion is the basic tactical unit of Infantry. It is responsible for coordination of all tactical action of subordinate units and elements in its zone of action. While a procedure is necessary, *it must be broad in scope and must permit the details of execution of reorgnization to be effected by subordinate units.* This enables the battalion commander, assisted by his staff, to personally supervise and coordinate actions of subordinate units and to immediately devote consideration to future plans.

5. In general, it is important to consider that reorganization must not be an end in itself, but rather a means of speedily regaining control so as to repel the inevitable counterattack and be prepared to continue the attack. A loss of initiative in the offensive can well be the result of negligence of this fact. *While reorganization is a continuous process throughout the attack, it is of necessity, hasty, improvised, and must be finally adjusted on the objective.*

It is not without good reason that many leaders have stated that the hardest single task in combat is to maintain organization and that prior planning and training pays off in reducing the details which are essential to efficient conduct of reorganization.

CHAPTER 5

Battalion Attack on Noroy Le Bourg

The 7th Army consisting of the 3d, 36th, and 45th Infantry Divisions, reinforced, landed in Southern France on 15 August 1944. In 23 days these three reinforced divisions advanced inland approximately 270 air miles, captured thousands of prisoners, and destroyed the enemy divisions and materiel in their path.

On 6 September, the 3d Infantry Division arrived on the outskirts of Besancon and after three days of hard fighting, captured the town. During this action the 3d Bn, 7th Infantry, spearheaded the encircling move against the town.

On 9 September the division resumed its advance toward Belfort Gap with the villages of Vesoul and Noroy Le Bourg as intermediate objectives. (See figure 21.) The 45th Division, located at Pierrefontaine, was covering the right flank, and the 36th Division, located at Dole, was covering the left flank. After taking Vesoul and Noroy Le Bourg, the 3d Division was to swing east toward the Belfort Gap. The 7th Infantry was given the mission of clearing the parallel road on the right (east) about 3 to 7 miles from the main axis. The 3d Battalion, 7th Infantry, was again designated to spearhead the advance.

In the next three days the battalion advanced 35 miles. Enemy opposition was almost continuous and developed into major skirmishes on the mountain north of Besancon, at Cirey, Loulans, Ormenans, Fontenois, Dampierre, Le Grd. Bois de Dampierre, and on the hill south of and overlooking Noroy Le Bourg.

The hill overlooking Noroy Le Bourg, the battalion objective for 12 September, had been taken after a brisk fire fight and was being consolidated at 1645 that day. Initially, the orders for the battalion upon reaching their objective

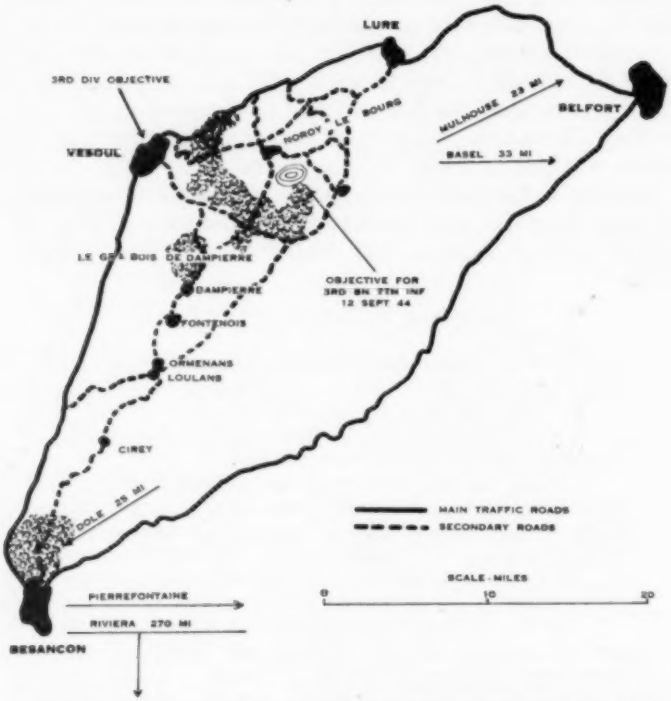


FIGURE 21.—Noroy Le Bourg controls the secondary road net leading to Belfort.

were to prepare a defense for the night and attack the town at daylight on 13 September. However, subsequent developments indicated that more aggressive action was required.

While the battalion was making preparations to defend the objective and formulating plans for attacking the town at daylight, it was learned from prisoners taken on the hill that the town was now being held by a reinforced battalion. The position of Noroy Le Bourg at the center of the network of secondary roads in the sector, its location on the railroad tracks, and its proximity to the main highway leading to Belfort indicated that it was equally important to the enemy's plan of defense and our own plan of attack; and of even

greater immediate importance, the road net permitted the enemy to reinforce the village from three directions. After a short conference between the battalion commander and the regimental commander, who had just arrived at the battalion CP, it was decided to make the attack immediately and try to capture the town during the remaining hours of daylight, if possible, but at least before the enemy could reinforce the battalion now holding the village.

As soon as the decision was made, the battalion commander assembled his staff, company commanders, and tank destroyer platoon leaders and issued the following attack order:

ATTACK ORDER (ORAL)

1. *a.* The enemy situation as gathered from the men captured on the hill is as follows:

(1) Approximately one battalion now occupies the town (Noroy Le Bourg) and all but one company moved into the town today.

(2) Three flak wagons (similar to our quadruple .50 caliber AA weapons) have been brought into town; one is located on the south road at the edge of town, one on the east road at the edge of town, and one on the west road at the edge of town. All three can fire to the south.

(3) At least one battery of light artillery and an undetermined number of mortars are somewhere on the north side of town.

2. This battalion will attack at 1800 and capture Noroy Le Bourg.

3. *a.* Company L will attack along the road, clean out the east half of town, and occupy the high ground north of Noroy Le Bourg. One platoon of heavy machine guns and one platoon of tanks are attached.

b. Company K will swing to the left and clear out the west half of the town. They will also prevent the enemy from reinforcing the town from the west. One platoon of heavy machine guns are attached.

c. The battalion command group will follow Company L. Company I will be in reserve and will be prepared to follow the battalion command group.

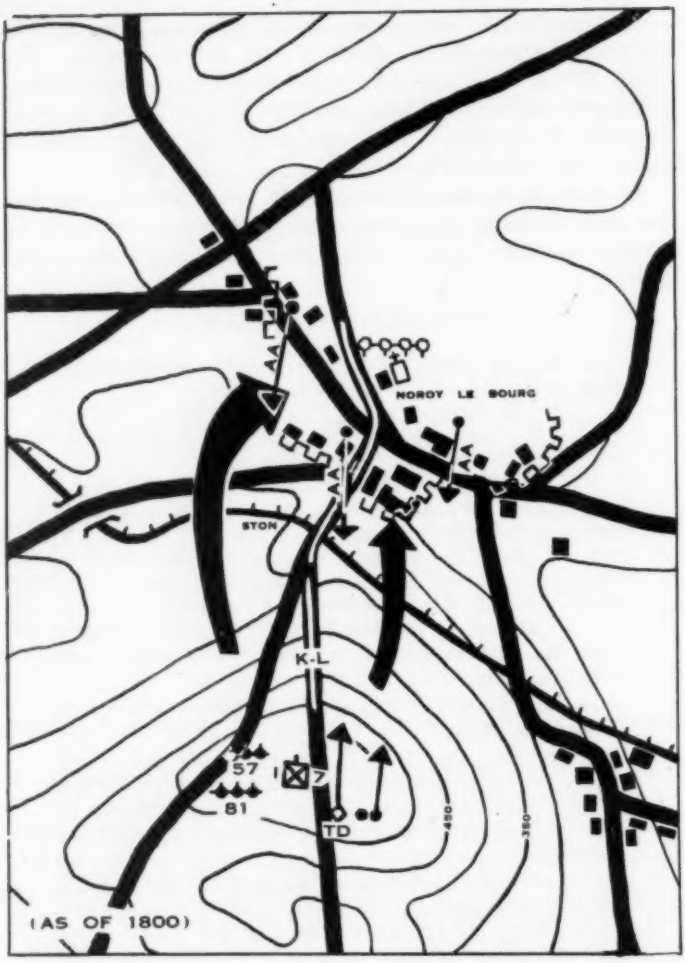


FIGURE 22.—Third battalion situation as of 1800.

d. All supporting weapons not attached will set up and fire from this hill.

x. Company commanders notify me as soon as you are ready to attack.

4. (Omitted.)

5. The battalion CP will be on this hill initially. Are there any questions?..... Move out.

THE ATTACK

By 1745 all unattached supporting tank destroyers, 57-mm guns, 81-mm mortars, and heavy machine guns were in position and ready to fire, and the company commanders reported that they were ready to attack.

Although they have been given only a short time to prepare, L and K Companies jumped off at 1800 hours. At the same time all supporting weapons commenced firing on the town. In retaliation, hostile light artillery, mortars, machine guns, and three flak wagons opened up on the advancing troops. Although the tanks, tank destroyers, and 57-mm antitank guns soon silenced the flak wagons, the volume of enemy artillery, mortar, and machine gun fire halted the attacking troops and threatened to break up the attack before it was well launched. The momentum of the attack was practically lost when a single individual (Lieutenant Greene, a Company L platoon leader) rose to his feet and started to move to the front. Ignoring the hail of enemy fire directed toward him, he began to shout *"Hande hoch!"* (Get your hands up!), still moving forward at a determined pace. Miraculously, the troops who had been halted only a minute before, rose and followed him, taking up his *Hande hoch!* as they moved forward. The attacking troops began to return the hostile fire, wildly at first, but soon the squad leaders began to function. The rash, headlong advance was slowly replaced by common sense fire and movement as the attacking troops continued to move forward.

While L Company was skillfully advancing on the town, observers stationed at the battalion observation post saw a column of enemy vehicles and horsedrawn wagons trying to leave the town by the west road. Tank destroyers and 57-mm antitank guns located on the hill immediately engaged them and rapidly destroyed 15 vehicles.

The commander of K Company, seeing the enemy column attempting to retreat, anticipated that other enemy troops might try to evacuate or reinforce the town by the same route. To prevent such action, he requested permission to swing further left and cut the Noroy Le Bourg-Vesoul road and then enter Noroy Le Bourg from the west. The Company I commander had a similar idea concerning the road leading east from the town and requested permission to cut the road to prevent the Germans from escaping or being reinforced by that route. Permission was granted to both requests with the provision that Company I would commit only one platoon.

Company L continued to advance under cover of their own fire. At the edge of town the tempo of enemy fire increased, again retarding the momentum of the attack. Again Lt. Greene arose to his feet an demanded *"Hande hoch!"* The Company again took up the battle cry and rushed the hostile positions to their immediate front. A few minutes later 25 Germans had been killed, 77 more had surrendered, and L Company's leading elements had broken into the fortified houses on the edge of the village! From then on it was house to house fighting against the Germans who were still determined to hold out. By 2000 hours, L Company had fought halfway through the town.

In this phase, the coordination of tank-infantry fighting was superb. The tank platoon leader dismounted from his tank and proceeded forward with the infantry; the tanks remained under cover until the infantrymen were held up, then the tank platoon leader would call one or two tanks forward and blast away the enemy strong point. Many of the enemy were killed by this action and a large number surrendered when subjected to close range fire from the tanks.

As the enemy gave ground, each sucessive house became a strong point. But even as darkness came on, the excellent coordination between tank and infantry was still the deciding factor which permitted L Company to continue advancing through the town. By 2015, L Company was just short of the church on the north side of the village (see figure 23) and still meeting determined resistance.

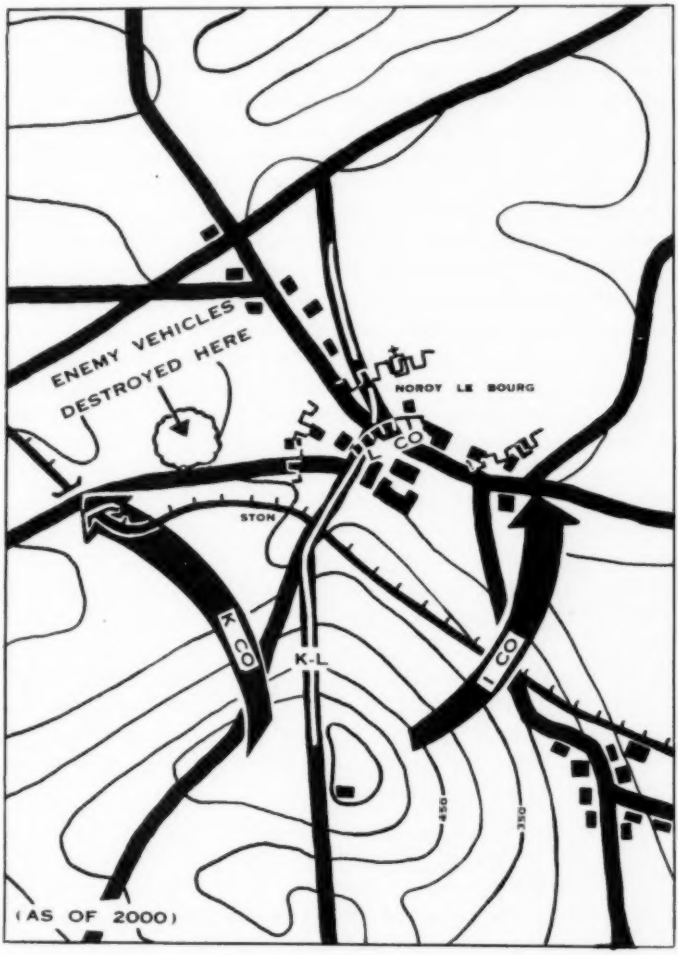


FIGURE 23.—Third battalion situation as of 2000.

During this time, K Company had cut the road leading from Vesoul to Noroy Le Bourg. After setting up one squad as a road block at the railroad crossing, the remainder of K Company started toward the town. The Company commander, still anticipating the possibility of enemy troops withdrawing or maneuvering along that route, was very cautious. Just as the leading elements reached the edge of town, they encountered approximately one company of enemy attempting to withdraw or maneuver. K Company, ready and waiting for just this chance, routed the greater part of the enemy company and captured those who were not killed. After this brief action they advanced into the town from the west against slight resistance, and made contact with L Company at 2100. They had suceeded in capturing their portion of the town and commenced to prepare a defensive position in case enemy reinforcements were dispached from Vesoul.

I Company, during this period, had maneuvered to the east and had run into a brisk fire fight while attempting to cut the road running into the town from the east. The enemy was obviously determined to keep the road open so that it could be used as a route for reinforcement from the east, or for a withdrawal toward Belfort. When it became apparent that one platoon could not cut the road, the battalion commander granted permission to commit the entire company at this point. By 2100, I Company succeeded in cutting the road and started moving toward the town to contact L Company. Because it was completely dark at this hour, movement was necessarily slow.

I Company was meeting only slight resistance, but while they were approaching the town they heard the roar of motors approaching them from the rear. The company deployed on both sides of the road at the road junction (see figure 24) and set up a hasty ambush for the vehicles. In a few moments two vehicles drove to the crossroads and almost stopped. In the darkness it could be seen that they were large trucks mounting flak guns and heavily loaded with troops. In addition, each truck was pulling an ammunition trailer which was also carrying troops. Not until the

trucks were within 20 yards of the nearest troops, did the company commander give the order to fire. Immediately the ammunition was set on fire, illuminating the whole area with bursts of flame. Only two men managed to jump clear of the burning truck and both were captured immediately. It was determined later that 35 enemy were killed on the two trucks and trailers.

I Company continued on into the town and experienced little trouble in taking many prisoners from the houses they searched. Contact was made with L Company about 2215.

L Company had continued moving very slowly against a determined enemy, but their tank-infantry combination, operating even in the dark, was still paying dividends. However, after I Company knocked out the flank wagons and reinforcements, the enemy in front of L Company indicated a desire to surrender and by 2300, L Company had cleared the center of the town and commence to organize the high ground to the north.

K Company, during this time, had consolidated their position in the houses on the west side of town and were well prepared for a counterattack. One squad, however, was still manning the road block at the railroad crossing to the west.

At 2300 hours, word was received that the first battalion would arrive at 2400 to relieve the third battalion. About fifteen minutes later the K Company road block was counterattacked. Judging from the volume of fire, it sounded as if the K Company squad was being attacked by at least a company. However, the fire fight was short lived, and soon only friendly weapons could be heard. By 2400, as the first battalion moved into town, K Company reported the situation well in hand and that 10 enemy had been killed and 20 prisoners (eight of them wounded) taken by the one squad at the roadblock.

By 0100, 13 September, relief of the third battalion was practically accomplished. No further enemy action developed during the night.

The next morning, as the results of the fight were tabulated, it was determined that approximately 75 enemy were killed and 308 captured (of which about 75 were wounded), making total enemy casualties 383. One 4-gun battery of

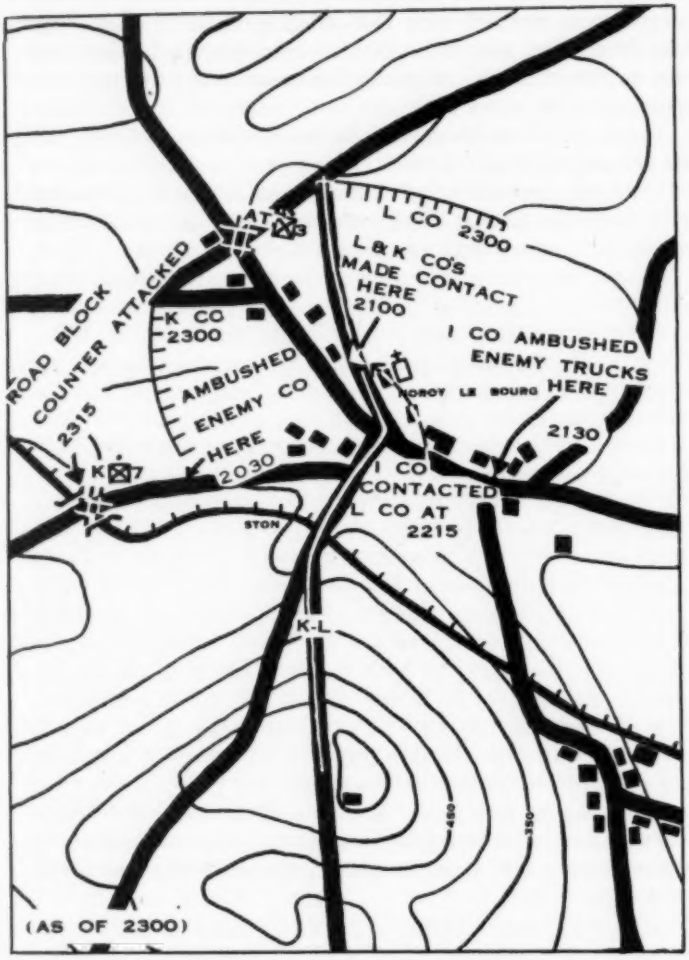


FIGURE 24.—Third battalion situation as of 2300.

75-mm artillery, plus about 800 rounds of ammunition and four 81-mm mortars with 1500 rounds of ammunition were captured. Five flak wagons plus ammunition trailers, fifteen motor vehicles, and ten horse-drawn vehicles were destroyed.

Third battalion casualties included one man killed, one officer wounded (Lt. Greene), 11 men wounded, and a tank with track blown off. (The man was killed and the tank damaged after the fire fight was over, when a tank, moving in the dark, ran over an unexploded shell!).

ANALYSIS AND LESSONS LEARNED

The lessons learned from this engagement can be reduced to three main points:

1. The unit involved in this action had advanced more than 300 miles in 28 days of continuous fighting. The men were tired and habitually fell asleep every time they stopped for a few minutes. Consider what might have happened to this attack when the battalion jumped off and immediately received a hail of enemy fire stopping the forward movement of the attacking echelon. But for the inspired actions of one man, this attack might have failed before it was well launched. However, the remarkable leadership of this one individual did serve to inspire his entire company and provide the necessary stimulus to change resigned immobility into aggressive attack. Obviously, a second attack against a fully prepared enemy in daylight would have been much more costly in men and materiel. Even more important, it too might have failed for the same reasons that this one almost failed. From this example, we can make two observations:

a. When the enemy is on the run, keep punching and don't give him a chance to get set.

b. A few men, or even a single individual, who demonstrate initiative, courage, and the will and determination to win can in a crucial moment, turn impending failure into success.

2. Prior to the attack the battalion commander gave a very brief order; during the attack the battalion commander gave practically no orders. The company commanders used their own initiative, visualized future events during the attack, and requested permission to change their plans to meet the varying situations. During the attack the company commanders not only made reports to the battalion commander, but they also coordinated their attack plans with each other. The following observations appear to be justified:

a. With properly trained troops, a well coordinated attack can be launched in a very short time, especially against a retreating enemy.

b. Well trained company commanders will recommend changes in plans as the attack develops and will coordinate their plans, not only with the battalion commander, but with adjacent companies.

3. During the street fighting, both day and night, the tank platoon leader accompanied the L Company commander on foot and directed his tanks by radio or signals. The following conclusions may be drawn from this example:

a. Close coordination and team work between suppporting and supported units speed up the operation and save lives and materiel.

b. Under favorable circumstances and with a very high degree of cooperation and coordination, tanks can be utilized for close support missions during hours of darkness.

CHAPTER 6

Functioning of the Regimental Staff in Combat

A ONE ACT PLAY

The statement has often been made, and truthfully, that a picture is worth ten thousand words. This has been found to be exceptionally true as it pertains to teaching regimental staff functions at The Infantry School. After presenting the basic principles governing the duties and organization of the regimental staff, it has been determined that the most effective way to integrate these principles and to actually show the students what a staff is and how its members function, is by use of a demonstration or skit. This demonstration depicts the regimental unit staff, certain members of the special staff, and other personnel of the regiment performing their normal duties during an assumed tactical situation.

The simplicity and ease of revising this skit is one of its most valuable characteristics for instructional purposes. It can be changed to apply to any staff by using an appropriate tactical situation. In addition, the cast can be increased or decreased at will. If instructors or other personnel are not available in sufficient numbers to take all the parts of the skit, then students can be used in several of the minor parts by a quick briefing before the presentation to the class.

Only a minimum number of stage props and items of equipment are needed to present the skit. For after all, a regimental command post, and particularly the combined S-2/3 section where most of the staff action takes place, cannot contain many pieces of equipment and remain realistic.

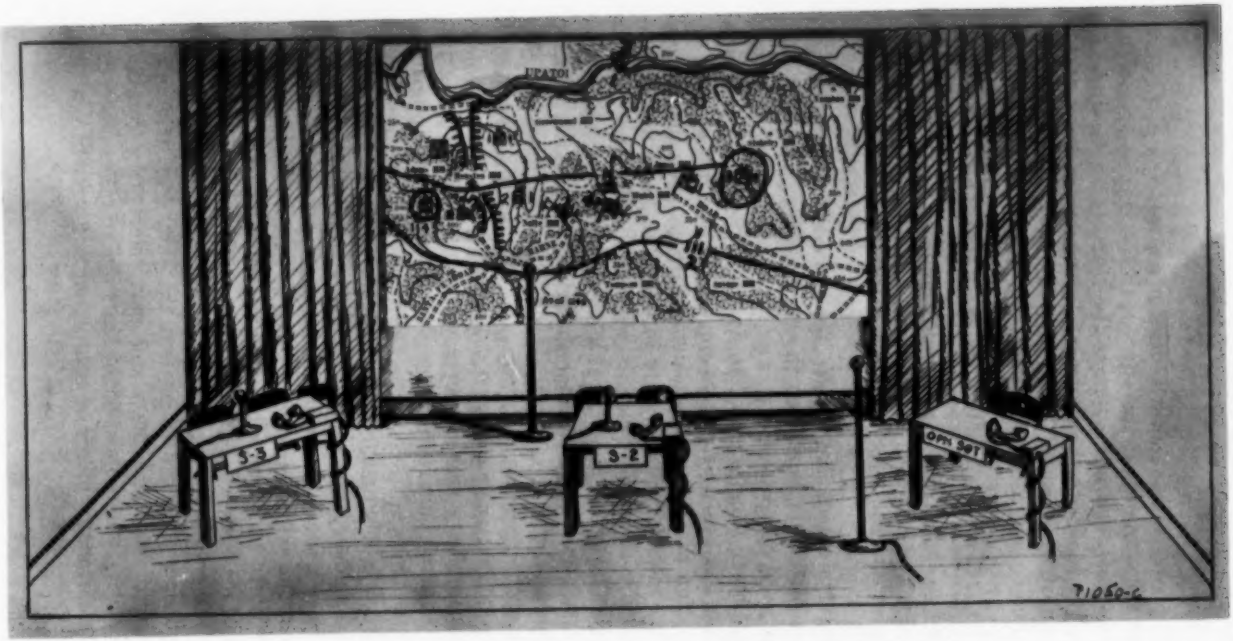


FIGURE 25.—Stage setting for scenes in regimental command post.

In presenting the skit, a brief orientation is given to inform the students of the purpose of the skit and to explain the tactical situation. Before the skit begins, a student is called to report to the regimental commander for duty as a liaison officer. Even this limited student participation has resulted in comical ad libbing by the student selected for this part. The ever present class wit is usually selected for this assignment.

The class is given a 10 minute break between the end of the skit and the critique because it has been found that a critique immediately following the lively skit results in a relaxation of student interest.

The stage or lecture platform is arranged as shown in figure 25. If a lecture platform is used, stage wings for the off-stage actors are made by placing wood or cardboard screens on each side of the platform. The actors then enter and exit from or to the rear of these screens. After a few rehearsals, each actor naturally picks the side of the stage which is most convenient for him to use as an exit or entrance.

The unit situation map is an enlarged sketch or map of the terrain selected for the regimental action. The regimental boundaries are painted on the map. Unit symbols and front line positions are depicted by red and blue cardboard pin-ups which may be shifted around as required by the action in the skit. The situation map used by The Infantry School at the opening of the skit is shown in figure 26.

Each member of the cast wears a sign on his chest indicating his duty assignment. The cast is as follows:

Character	*Sign Worn*
Regimental Commander	Regtl Comdr
Regimental executive officer	Regtl Ex O
Regimental S-1	Regtl S-1
Regimental S-2	Regtl S-2
Regimental S-3	Regtl S-3
Regimental S-4	Regtl S-4
2d Battalion commander	2d Bn Comdr
2d Battalion S-3	2d Bn S-3

3d Battalion commander	3d Bn Comdr
Regimental communication officer	Com O
Operations sergeant	Opns Sgt
Messenger	Msgr
Student liaison officer	Ln O No 2

The uniform for all actors is the field uniform with leggins or combat boots and helmet liner. The messenger is dressed in oversize fatigue clothes and is made as sloppy in appearance as possible. The student liaison officer wears the uniform worn by the students since he is not advised in advance of his participation. (If his uniform varies radically from that of the other members of the cast, it usually results in a "chewing-out" by the regimental commander in the final scene.) The only piece of special equipment is the telephone plug-in set used by the operation sergeant in monitoring calls (chest set TD-1).

For large classes, special sound equipment is needed. The arrangement found most satisfactory is to use all nondirectional microphones. A table microphone is placed on the center and left tables and stand microphones are placed at center stage near the situation map and in front of right table.

The following is a reproduction of the script of the skit as it is presented to students of the Infantry Advanced Course.

THE REGIMENTAL STAFF

in

One Act—Three Scenes

INSTRUCTOR. In this brief demonstration, we will present examples of good and bad staff functioning. This will give you an idea of how the instruction given in the preceding periods actually operates in its practical application. Instructors will take the parts of the various staff officers of an infantry regiment, performing the work of their different sections in an assumed tactical situation. Our only request is that you do not confuse our lack of histrionic ability with poor staff functioning, for most of our so-called actors do perform their jobs according to the teachings of The Infantry School.

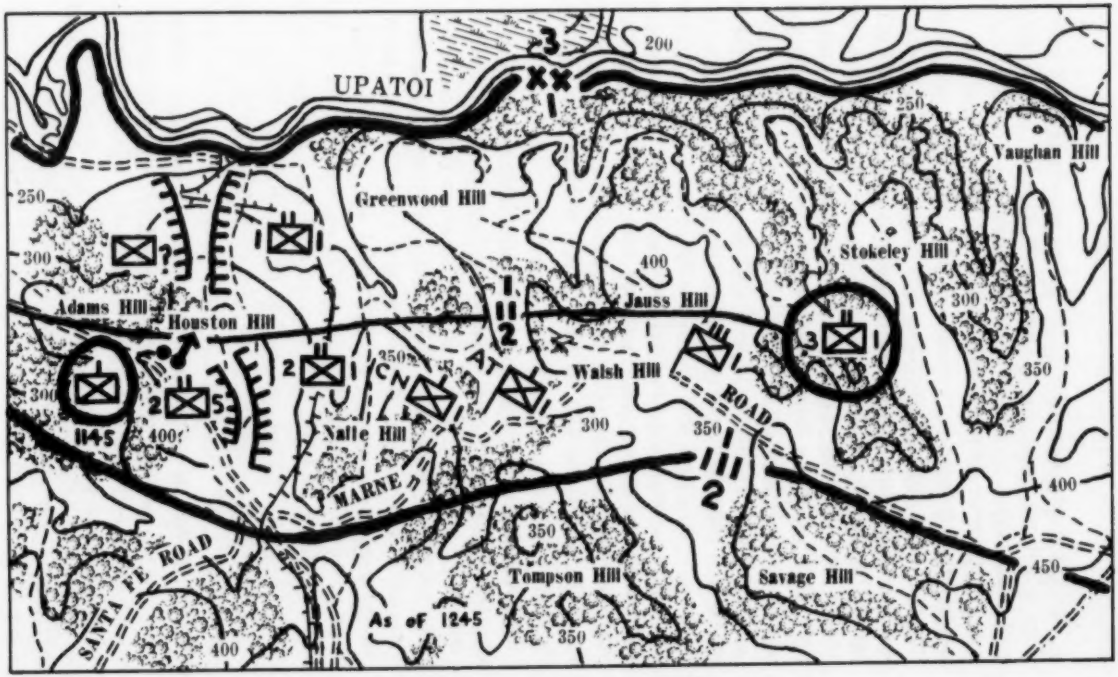


FIGURE 26.—Regimental situation map.

The demonstration illustrates a few points of staff procedure which we want you to observe. Notice the coordination and supervision of effort by the regimental executive officer, the teamwork for which the staff strives, and the relationship between staff members and the regimental commander. One general consideration is that the staff officer is not part of the chain of command; instead, the staff officer is an agent in the transmission of the commander's orders and desires. Also, you will observe an example of poor staff work as mentioned before, which we hope you will have no trouble in distinguishing from the good.

The general situation is as follows: The Chattahoochee River is a boundary between hostile states; the enemy, (Reds), to the west and the friendly state, (Blues), to the east. The Reds have declared war and have attacked the Blue state and now occupy part of the Fort Benning Military Reservation. We, the Blues, are engaged in counterattacking the Reds and driving them west of the Chattahoochee River.

The present situation is as follows: (Show map with situation of 1st Infantry posted on it.) Here is the line (pointing) now held by the First Battalion First Infantry; here the second battalion. Both are pressing the attack to the west at the present time. The second battalion committed its reserve company at 1200 and the first battalion, after a heavy counterattack by the Reds, committed its reserve company at 1300. The time is now 1345 and the scene opens in the command post of the First Infantry where the executive officer is holding a conference with the S-1, 2, 3, and 4 in the S-2/3 Section.

Here comes our S-1 now. *(Regtl S-1 enters stage alone.)*

S-1. Well, we just had another casualty. Liaison officer No. 2 got hit, so I've got to get a replacement for him.

INSTRUCTOR. Who are you going to get, you said this morning we had no replacements coming in today.

S-1. The colonel told me to get one of those new officers who just arrived from The Infantry School last week, so I'm sending for Lt. Brown.

(S-1 calls one of the students to report to the Regtl Comdr behind stage as Ln O No. 2.)

SCENE I

(As scene opens, the Regtl Ex O and S-4 are standing in front of situation map. S-3 and S-2 are seated at desks.)

EX O. S-4, the Colonel liked your plan to pool the extra gas cans in the regiment into a supply point in the train bivouac. Put that into effect at once.

S-4. Yes sir.

EX O. BUT, he didn't like the feeding schedule last night. He said if you didn't get supper to the troops before one o'clock tonight, there may be a new S-4 tomorrow.

S-4. Ouch! I was afraid of that. Yesterday, division G-4 announced a last minute change of drawing time at the ration dump. This threw us completely off schedule last night but next time I'll be prepared. I promise it won't happen again.

EX O. Well, let's have less excuses and more supplies or there won't be a next time. *(S-4 leaves stage.)*

(Dopey looking messenger enters, searching for message in pocket.)

MESSENGER. *(To Ex O)* Hey—I got a message for ya'—somewhere.

EX O. Don't hey me! Take it to the sergeant major in the S-1 tent like you are supposed to do.

(Messenger exits still searching for message.)

EX O. S-3, your work always seems to be piling up on you. You must be trying to do all of your work alone. Get S-2 to help during your busy periods each day. Incidentally, S-2, get a new intelligence summary out to the units this afternoon—the old one's out of date.

S-2 and S-3. *(In unison)* Yes, Sir.

(S-1 enters and stops in front of the executive.)

S-1. Colonel, will you get a decision on the new men we get tonight—should I make assignments to the units immediately or hold them here as a group for S-3 who wants to give them some specialized training in river crossing before we get to the Chattahoochee?

EX O. All right, I'll get a decision on that right away. The old man may want them to get the special training in addition to some basic training since we've suffered only light casualties so far. That last bunch we got were raw recruits.

(Ex O pauses and looks over his notes.)

EX O. That's all for right now,—except you S-3. I want to see you a few minutes.

(All exit except S-3 and Ex O.)

EX O. Smith, I've had a few bad reports about your attitude when you talk to the subordinate unit commanders and staffs. When you talk to them, or give them instructions, don't say "I want you to do so and so." Say "the Colonel wants or desires this or that." Don't forget, you work for him just like I do. Is that clear?

S-3. *(Very sullenly.)* Yes Sir.

EX O. And another thing- - - - - -

(Off stage.)

VOICE. Executive Officer!!!

(Answers off stage voice.)

EX O. Yes sir, I'll be right there. *(To S-3)* I'll finish this with you later.

(EX O exits - S-2 enters.)

S-2. What's the matter, Smith, you look worried?

S-3. Ah, I don't see why the exec is always jumping on me. Take just now for instance, he was quibbling over a few words. He says when I address the unit commanders I should say "the Colonel DESIRES this or that." What's the difference as long as I get results?

S-2. *(Soberly)* Smith, it's not just a question of the difference in a few words. I've noticed several occasions when your approach has completely endangered the chain of command without which no commander can personally control his unit.

S-3. Oh nuts! You sound just like a field manual yourself. *(Irritably)* Don't you start trying to lecture me! I know how to do MY job.

S-2. OK-OK, I was only trying to help you out.

(Opns Sgt enters.)

OPNS SGT. *(To S-2)* Here's a message for you, Major. *(To S-3)* Sir, overlays just came from the battalions showing their positions. While you were with the executive officer, I drew a consolidated overlay for you to send to division. I'll post them on the situation map.

S-3. That's fine, sergeant. Don't forget to send the battalion overlays to the sergeant major for him to file.

OPNS SGT. No, sir, I won't.

(He proceeds to rearrange map and then takes seat.)

S-3. See there S-2, that's the way to train your men, right on the ball. I don't have a thing to worry about.

S-2. You seem to forget that he started out as my T/5 draftsman and I trained him to be a good operations man. *(Pauses to look at message)* Listen to this message from the first battalion. *(Reads aloud)* "Six prisoners, First Company, Fifth Red Inf. PWs captured while trying to infiltrate between A and B Companies; now enroute to your CP." *(Looks up)* I hope they remember to segregate the privates this time so our interrogators can get some good information from them.

S-3. Yeh—that officer in the last bunch had really shut them up like clams. They'll do it everytime.

S-2. He did a good job alright. Say, Smith, I am worried about the terrain ahead of us. The ground forms indicate a swamp in our zone but the map doesn't show it. If there is one, it will make a big difference in the colonel's plans.

S-3. It certainly will. Why don't you send a patrol out along the creek bank and find out?

S-2. I would, but all of the I&R Platoon are out on another mission. Do you think I can get a patrol from the third battalion?

S-3. Sure you can. The colonel has given ME permission to call on the reserve battalion for patrols anytime I want one , but it will take about 45 minutes to get them up here and you will have to issue orders to them, then you'll have to notify A Company and the artillery commander that a patrol is going forward along the creek bank and will be out about 2 hours and then you- - -

S-2. *(Interrupting)*—Yeh, Yeh—I know how to send out a patrol. Go ahead and call for one sergeant and four good privates. In the meantime, I'll call G-2 and see if he has something on it, since I need the information immediately.

S-3. All right, I'll order the patrol right away.

(S-2 exits and the Regtl Comdr enters with the Comdr of the reserve battalion—the 3d. The Regtl Comdr makes a change in the location of the 1st Bn moving their front line forward about 400 yards and leaving a gap between it and the 2d Bn.)

REGTL COMDR. S-3, get over here to the map and listen in on this. I just talked to the CO of the first battalion by telephone. The situation is shaping up just about the way we figured it this morning. The second battalion is held up by fire from Houston Hill, while the first has continued along the creek bottom another 400 yards before it was held up. I don't believe the second battalion can move. *(To 3d Bn Comdr)* You have three plans worked out, haven't you, for commitment of your battalion?

RES BN COMDR. Yes sir, I have plans "A" & "B" for around the left or right flank and plan "C" to take advantage of any gap between battalions. Company commanders have already made partial reconnaissances for all three plans.

REGTL COMDR. Fine, I think plan "C" fits our present situation the best, so concentrate your future reconnaissances on the center. How soon could you put it in effect if we decide to use that plan?

RES BN COMDR. It would take at least an hour and a half from our present positions.

REGTL COMDR. *(Irritably)* Oh—NUTS—you would have to do it quicker than that!!!!

(Jerks off helmet in anger.)

RES BN COMDR. *(Irritably but respectfully)* Well—I'm open to suggestions on how to do it—Sir. But I just can't beat logistics. The battalion is about 1500 yards from the front now. The company commanders and I could make additional reconnaissances while the troops move forward, but I've still got to allow enough time to issue

my orders, assemble all the troops, issue extra ammunition, time for the actual move and then the smaller unit commanders will have to look around and issue their own orders.

REGTL COMDR. *(Resignedly)* I guess you are right about it—BUT *(Angrily)* S-3, YOU told me that either plan could be put into effect in less than one hour. Did YOU consider any of these factors for your time estimate or contact the battalion S-3 to see what they thought about it? I'm sure you didn't! *(To 3d Bn Comdr)* All right—time's passing fast, and it looks like we may have to use your plan "C" before the afternoon's over. However, if we do, it will have to be on less than an hour and half notice. So you had better get your outfit moving and put them in this area behind Nalle Hill. *(Points to an area to east of Nalle Hill on the map.)*

RES BN COMDR. Very well, Sir. I'll let you know when we close in there.

(Regtl Comdr and 3d Bn Comdr depart together.)

(Regtl Com O enters.)

S-3. Hello, Shaw. I was about to send for you. The old man has started getting hot about my plans for use of the reserve battalion. I've got to get them finished right away. How do you plan to tie-in a telephone line to the third battalion if and when it moves up to the front in our zone?

COM O. Oh, that's no problem at all. Regardless of where they are to be employed in our sector, they will tie-in their line with the nearest line of either the first or second battalion. As soon as they are established in their own sector or position, the battalion Com O will report to me and my wire team will lay a direct line to them. I've already made complete arrangements with the third battalion Com O.

S-3. That's fine—that's fine. Now how about your line to the second battalion? It's been shot out about a dozen times so far today. Can you run an alternate wire to them right away and keep it off of Marne Road? The Red artillery tears everything up that gets near the road including your wire line.

COM O. Yes sir, you're right about that. I've already given up on that line myself. My team started a new line about 30 minutes ago along the trail just north of Marne Road. It should be into the second battalion's CP in about 30 minutes. I'm sure that we can keep at least one of those two lines in from now on.

S-3. Fine—fine. That's the way to get ahead in this outfit. Keep one step ahead of the old man. He'll like it when I tell him that WE'VE got all of that taken care of!! By the way, before you go, what time is it? My watch has stopped again.

COM O. It's now 1410.

S-3. Hmmm, I should be getting the 1400 reports from the units by this time. They never seem to be on time with them,—particularly the second battalion S-3. I don't know what they do down there all the time. I always have plenty of time to make MY reports every hour to the division G-3.

COM O. *(Slightly sarcastic)* Well, I hear they have been doing a little fighting down there! That could account for the delay.

(The telephone rings and is answered by S-3. The Opns Sgt takes notes while monitoring the call by ear phones. Com O exits and Ex O enters. Ex O studies the map a few seconds and S-1 enters. S-3 continues on the telephone.)

EX O. S-1, get in touch with S-4 and tell him to get the supply situation posted on this map. I was surprised the old man didn't say something about it to me. He must not have noticed it. I know we have a train bivouac somewhere. Remind S-4 that it is the responsibility of each staff section to keep this map posted up to date at all times.

S-1. Yes sir.

(Dopey looking messenger enters and starts toward the Ex O.)

EX O. Now look, messenger, for the last time, incoming messages go directly to the sergeant major regardless to whom they are addressed. Is that clear?

(Messenger nods and slouches off stage.)

EX O. S-1, you seem to be catching on to your work much better now. You did a good job on this last move of the command post—even the trucks were dispersed in the motor pool when I checked around to see how things looked.

S-1. Well, Sir, after the way you ream—, I mean talked to me after the last move, I thought I had better change my system. So, I have decided now to pick all CP locations myself instead of having the headquarters commandant do it for me. Then I turn it over to him for the internal arrangement and security measures.

EX O. That sounds like a good plan. How about the unit's strength reports, do you have the figures up to date? The old man was just asking about them.

S-1. Yes Sir, I have them right up to date in my work sheet. I'll make two copies and give them to you and the colonel.

EX O. And the mail—I know I should get at least one letter from my wife once in a while.

S-1. Yes sir, I have arranged for it to come up on the mess trucks tonight from the train bivouac.

(Ex O and S-1 sit down and S-3 rings off the telephone.)

S-3. Sergeant, you got all that didn't you? They're really having a tough time in the second battalion zone. Get it written up right away so I can show it to the colonel. We'll have to get some action started immediately to stop that Red counterattack on the second battalion if we are to capture Houston Hill before tonight.

(Regtl Comdr enters.)

S-3. *(Excitedly)* Colonel, I just got reports from the first and second battalions, and things don't look so good. The Reds are now counterattacking the second with about a reinforced rifle company here on the left flank. They have been pushed back about 150 yards on the left but have held their right flank here. *(S-3 moves 2d Bn left flank back about 150 yards on map and posts a red arrow showing a Red counterattack on the position.)* The left flank of the first has moved forward, leaving this wide gap between the two battalions. I recommend committing the

third immediately through this gap to seize Houston Hill from the north. That will get our main objective and also relieve the pressure on the second. They can then concentrate on their left flank and wipe out the counterattack. The third battalion should be closing into their new area. It's now 1435.

REGTL COMDR. *(Speaking slowly and with some hesitation)* Yes, I think you are correct on that. The second battalion has suffered rather heavy casualties and they can't stand too much more in their present condition. *(A slight pause, then speaking with determination)* Call the rest of the staff in and let's get this thing worked out.

(S-3 calls the entire unit staff together.)

REGTL COMDR. *(Speaking with conviction)* The situation at the front doesn't look too good. The second battalion has been pushed back to this line here on the left. *(Pointing to map)* However, the first has been able to advance here on their left, so we are in a good position to do a little work ourselves with the third battalion. I've decided to commit the third at once through this gap to seize Houston Hill from the north. All of you have studied the third battalion's counterattack plan "C" which we will use. Let's have any information you have on it and your recommendations for the whole regiment. S-2, what do you know about the enemy?

S-2. I talked to the second battalion S-2 a few minutes ago and they have two prisoners from this attacking force who state this is one rifle company—Seventh Company, Fifth Infantry—reinforced with one heavy machine gun platoon. They were in reserve in these woods *(Points to woods in rear-west of Houston Hill and in the regimental sector to left of 1st Infantry)* and were ordered to encircle our troops here and prevent us from taking Houston Hill. They were the reserve company of the Second Battalion, Fifth Infantry, which is holding Houston Hill. This Red company is still here in our sector as far as I can tell. *(Points to enemy reserve company posted on map)* There has been no movement out of the area observed, and they are the only enemy reserve force located so far. That leaves one battalion less this one company on Houston Hill

and they have suffered heavy casualties. Our first battalion faces what is estimated as an infantry battalion less one rifle company.

The enemy can counterattack with his reserve unit here *(pointing)* or else delay our advance to this line where their reserve is located and establish a new line of defense there. It is reasonable to assume that they will counterattack us again when we get on Houston Hill.

REGTL COMDR. All right, that's a good coverage. How about you, S-3?

S-3. The plan I worked out for the regiment, in case you put the third battalion's plan "C" in effect, is to leave the battalion boundary where it now is and to have the third battalion attack into the second battalion's zone. Then after the third seizes Houston Hill, they will take over the second battalion's zone to continue the advance to the west. The line of departure, of course, will be along this gap between the first and second battalions. We should be able to attack by 1530.

For support of the third battalion, how about attaching one antitank platoon from the antitank company to the battalion and give them priority on all cannon company fires. We can arrange for supporting artillery fires with the artillery. I think we should ask for a ten minute preparation and then have them lift their fires to this draw west of Houston Hill at the time of attack.

REGTL COMDR. That's all OK except for the antitank platoon. The company commander has his weapons well disposed to repel any armored attack in our zone and I don't want them changed. He has one platoon well up in the second battalion's zone on First Division Road and that can support the third battalion if necessary without making any attachments. So, no attachments from the antitank company now. Anything else?

S-3. Yes sir. The first battalion should renew their attack simultaneously with the third. The second battalion should hold their present position but support the attack with fire, moving it to the south as the attack advances. That way, they will have all their fires concentrated on

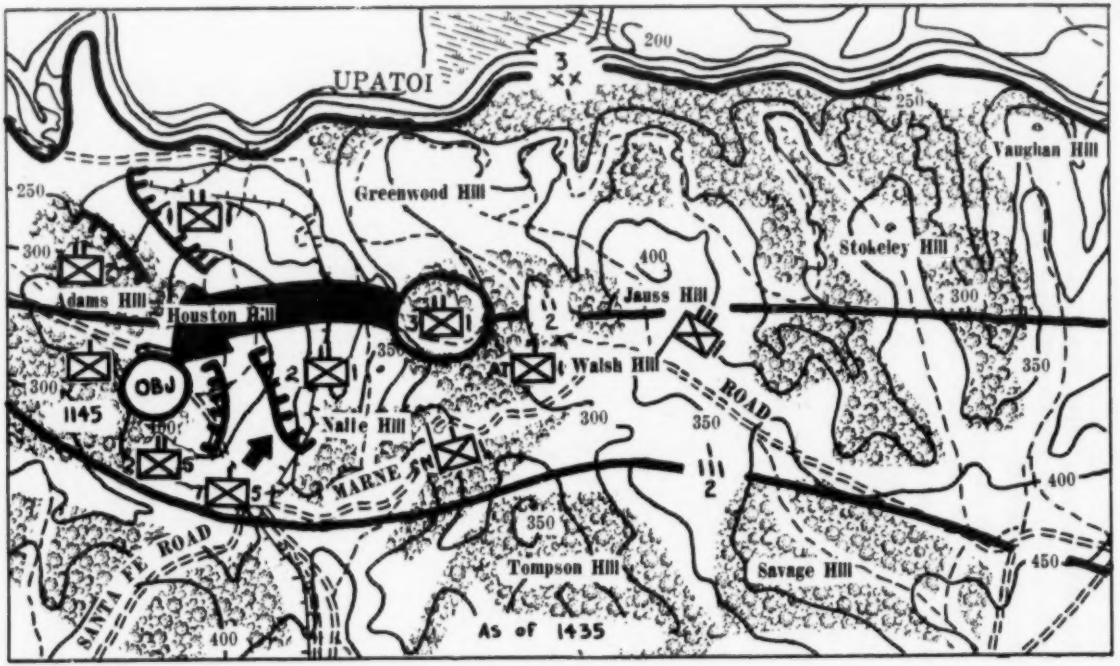


FIGURE 27.—Plan for employment of the third battalion.

their left and take care of the attacking enemy on our left flank. After they finish off those troops, they will revert to regimental reserve in the area they are now in. Also, I still think the third battalion needs something attached to them. How about the cannon company platoon which is in position here in the center of our sector?

REGTL COMDR. Maybe you are right on that. OK, we'll attach that platoon to the third battalion and we can have the second antitank platoon which is supporting the second battalion go into direct support of the third battalion after they capture Houston Hill. S 4, have you anything?

S-4. No sir, all the units have plenty of all supplies. Each battalion has one reserve unit of fire. I'll check on their resupply when the attack jumps off.

REGTL COMDR. Fine, fine. S-1, how are your personnel problems?

S-1. Nobody is hurting too much except the second battalion. The third is full strength and the first is only slightly under strength. The replacements we get tonight will just about bring the regiment up to full strength.

REGTL COMDR. Oh yes! The exec asked about assigning those men. I want them assigned immediately. The second battalion will have to get their share at once, so you may as well assign them all. The battalions will need all they can get hold of when we hit Fort Benning in the next day or two. I believe that will be a pretty tough place. Anything you can think of, exec?

EX O. No sir, I can't think of anything not covered, except possibly getting the enemy information S-2 just gave us down to all the units.

REGTL COMDR. Right! How about it S-2, do the units have any of that?

S-2. Yes sir. I sent out a new intelligence summary to all units just before you sent for us. I placed a copy on your table. The I & R platoon is busy now putting in the new OP on Nalle Hill which we talked about this morning. *(Points to Nalle Hill.)* The interrogation team is now

questioning the six PWs captured by the first battalion. I'll have any information I get from either the I & R platoon or the PWs distributed immediately.

REGTL COMDR. OK. By the way, one more thing. I was studying the map and wondered about this ground to our front. Is there a swamp on our right flank just in front of the first battalion?

S-2. I've been thinking of the same thing, colonel. I called G-2 and they have nothing on it. S-3 has just called for a patrol from the third battalion which I am going to send along the creek to find out. Also, the six PWs just came from there and we may get something from them.

REGTL COMDR. Well, let me know as soon as you do. However, cancel that patrol, S-3. The third battalion will need all their men and besides, S-2 can get busy and see that we get that information from the PWs. You can make them talk about the terrain, at least, can't you, S-2?

S-2 and S-3. Yes sir.

(Res Bn Comdr enters)

REGTL COMDR. Oh, there you are. You're just in time. Get over here and listen to my plans. We are going to commit your battalion immediately.

RES BN COMDR. All right sir. We just closed into this area. *(Points to Nalle Hill on map.)*

REGTL COMDR. The enemy has completely stopped the second and shoved them back with a counterattack by one reinforced company on their left flank. The Red Second Battalion, Fifth Infantry is holding Houston Hill except for the one rifle company making the attack on the second battalion. One enemy company is known to be in these woods west of Houston Hill. One battalion minus one company is opposing the advance of the first battalion.

We will renew our attack at 1530 to seize Houston Hill. The line of departure will be the present line now held by our troops. Battalion boundaries will be unchanged.

The First Field Artillery Battalion will start a ten minute preparatory fire on Houston Hill at 1520. At 1530, these fires will lift to the draw here just west of Houston Hill.

Your battalion will attack through this gap between the first and second battalions to seize Houston Hill from the north. After capture of the hill, you will take over the second battalion's sector and prepare to continue the advance on order to the west. The third platoon of cannon company will be attached to you. In addition, you will have priority on the fires of all other supporting weapons now in the second battalion zone.

The first battalion will hold their present position until 1530, at which time they will attack to retain all forces on their front. They will maintain contact with your battalion on their left flank.

The second battalion will support your attack with maximum fire possible, shifting their fires to the south as you advance. With this concentration of fires on their left flank, they will destroy the enemy counterattacking forces and then revert to regimental reserve in their present positions.

The second battalion zone will be taken over by you after the capture of Houston Hill. At that time all supporting or attached units of the second will pass to the third battalion.

The time is now 1435. Do you have any questions?

RES BN COMDR. Yes, sir. How about smoke? I'd like to have Adams Hill smoked from 1530 until after I capture Houston Hill.

REGTL COMDR. OK. S-3 arrange for cannon company to perform that mission.

REGTL COMDR. *(To Res Bn Comdr)* All right, get your battalion moving right away.

(Res Bn Comdr exits)

REGTL COMDR. Executive officer, get liaison officer number 2 and see that he understands the plan, then send him to the first battalion and let him give it to them. S-3, for the second battalion you had better take the order to the CO yourself or the plan is sure to get snafued. They seem to think that in this man's army, common sense is used as the last resort.

S-3. *(Starting out)* I'll get going immediately.

REGTL COMDR. Now wait just a minute, there may be a few more details we haven't arranged yet. What have you and the communications officer done about maintaining communication with the third battalion?

S-3. He has already arranged for the third to tie-in with the nearest battalion line as they move forward; in this case, the first battalion, and lay his own line forward. As soon as they are established, the Com O will report to me and then our wire team will lay a direct line.

REGTL COMDR. That sounds like it will work out. All right, if there is nothing else from anyone let's get started. There's plenty of work for everyone to do.

EX O. *(As S-2 starts off stage.)* S-2, send liaison officer number 2 in to see me.

(S-2 exits.)

S-3. *(To Opns Sgt)* I am going to the second battalion and will be gone about one hour. *(To S-1)* Say, S-1, have you got your journal up to date?

S-1. *(Caustically)* That's my job isn't it?

S-3. *(Arrogantly)* That's no answer—but when you return to your tent, have me signed out to the second battalion.

S-1. *(Muttering to himself)* I'd like to REALLY sign you out somewhere . . .

(S-3 exits.)

(Ln O No. 2, a student, enters.)

EX O. Liaison officer!—come over here to the map. I have a message for you to take to the first battalion command post. You are to give it to the battalion CO personally if he's there. *(Ex O orients Ln O No. 2 on the situation and details of the attack concerning 1st Bn using a small map board. This conversation cannot be heard by the audience. Regtl Comdr silently studies map for a few seconds until the phone rings. Opns Sgt moves to center table and answers it.)*

OPNS SGT. Hello—Yes sir, just a second. It's for you Colonel; it's the division commander.

REGTL COMDR. Monitor this call, Sgt. *(Opns Sgt puts on ear phones and takes notes. Regtl Comdr picks up handset and begins talking.)*

REGTL COMDR. Yes, sir—Yes sir—Yes sir—Oh NO, General—I mean, YES SIR—Yes sir—Yes sir—Very well, sir. *(Rings off)* Sergeant, did you get all of that?

OPNS SGT. Yes sir.

(S-2 enters and S-1 exits)

REGTL COMDR. Mac, has S-3 left yet?

S-2. Yes, sir, I saw him drive off about a minute ago in a cloud of dust.

REGTL COMDR. NUTS! *(Turns to Opns Sgt)* Sgt, be sure a copy of that message gets into the journal for a record. S-2, the attack is off. After all our plans for the use of the reserve battalion, the division just ordered me to release the third battalion to them for some special mission. Probably to guard the division command post!!! Liaison officer number 3 is now on the way down with new orders. You contact the second battalion and try to stop S-3. In any case, get word to the battalion CO that the attack is off, and that he is to hold what he's got until further orders. Also send liaison officer number 1 to stop the third battalion where they are and have the CO report to me for new orders. *(To Ex O who is still talking to Ln O No. 2)* You can stop there and send that young man back to the chow line where you got him—there's no need to tell the first battalion anything now.

EX O. Yes sir.

(Regtl Comdr walks out muttering disgustedly, while S-2 tries to get 2d Bn on telephone. Ln O No. 2 exits and Ex O takes a seat.)

S-2. *(To Ex O)* I can't get the second battalion on the phone to stop S-3 from giving the attack order so I've got to rush down there. Will you take over while I'm gone?

EX O. OK, go ahead.

(S-2 rushes out)

(Instructor closes curtains over situation map. No other change is made on stage. He announces the end of Scene I and states that the next scene takes place in the 2d Bn C P)

SCENE II

(As the scene opens the 2d Bn Comdr is at the center table and his S-3 is at the left table. The Comdr is studying a situation map on a map board on his table. Bn S-3 is working with a stack of papers. Regtl S-3 strides arrogantly across the stage to the table occupied by the Bn Comdr.)

S-3. Good afternoon, Colonel, I've got some big news for you.

BN COMDR. Hello, Smith, I need something big up here. I was just about to call Colonel Davis and ask for some help. We are pinned down by fire from Houston Hill and we can't move another inch without some help. We've lost contact with the first battalion too.

S-3. You'd better not let the colonel hear you say you are pinned down. You know what he says about that *(imitating colonel's voice)* nobody is ever really pinned down! However, I've got just the help you need. The third battalion is going to attack between you and the first at 1530 to seize Houston Hill from the north. You see, here's the situation—

BN COMDR. *(Interrupting) Wait a second—(To Bn S-3)*—Jim, you'd better get over here and get all the latest dope.

BN S-3. Yes sir. *(Moves over to Bn Comdr's table.)*

REGTL S-3. The first battalion has advanced to here—*(points out situation on map on Bn Comdr's table)* and this gap is being used for the third battalion attack. *(Orients Bn Comdr on situation.)*—then you are to hold your present position until 1530. You will support the attack of the third battalion by maximum fire to your front. As the third advances, you will shift your fires to the south. This will enable you to wipe out the counterattack on your left flank. After you do this, I want you to assemble your battalion in your present position as regimental reserve. Did you follow me on that? Then, I think it would be a good idea for you to prepare for an all around defense in this area and also to prepare to meet any more counterattacks from the southwest.

BN COMDR. *(Slightly nettled)* You don't have to tell me how to defend my own area. I'll take care of that. Jim, get on the 300 radio and tell the companies to hold their present positions until further orders and to prepare to renew their efforts at 1530. And—be sure you use the prearranged code this time. Then assemble the rest of the staff for my order. *(To Regtl S-3)* I moved the second cannon platoon off the road over here to my left flank to help me on this counterattack. I'll leave them there for the attack.

(Bn S-3 leaves.)

REGTL S-3. But Colonel, don't forget that the cannon platoon is only in support, not attached to you. We may get other plans for them.

BN COMDR. *(Sharply)* Oh, the hell with it! They are up here and I need them myself.

S-3. I'll have to tell that to the regimental commander!!!

BN COMDR. *(Conciliatorily)* OK—OK. Now, I'll also need an antitank platoon on this left flank. Can YOU attach one to me?

REGTL S-3. YES SIR, I can do THAT. I think you'll need one too, in case you have another counterattack on this flank. So, on the way back, I'll send you the second platoon. Say, I noticed as I came in that none of your officers have fox holes dug. You know the colonel tells us to pick up things like that and report them.

BN COMDR. *(Disgustedly)* Fox holes be damned!!! We're fighting a war up here. *(Turns and walks away as the Bn S-3 enters and approaches the Regtl S-3)*

REGTL S-3. Say, I have a few things for you, too. If liaison officer number 2 comes by here, tell him to stay here until the attack jumps off and then report back to the regimental CP with all the facts.

BN S-3. All right, SIR. Maybe you can help us out too. Our S-4 reports that he can't get regimental S-4 on the phone and we need two heavy machine guns badly.

REGTL S-3. Sure—I'll take care of that for you. Just let me know when you need something. Here's the main thing. We haven't been getting enough information back

at regiment to even know where you are. I want you to get on the ball. I want YOU to send ME an overlay every half hour for the duration of this operation. You got that straight?

BN COMDR. *(Angrily)* SAY—I heard that! Did you know he works for me? Any orders or complaints you have, put them through me and make damn sure it's what the regimental CO wants and not what you want. Do YOU have that straight?

REGTL S-3. *(Sullenly)* Yes sir.

(S-2 rushes on the stage)

S-2. Hold everything!—Colonel, has S-3 given you the dope on the attack?

BN COMDR. Why yes, was he all wrong?

S-2. Well, the colonel sent me down to tell you the whole thing is all off. Division is taking the third battalion away from us, so the colonel directs that you hold what you have and wait for further orders.

REGTL S-3. *(Laughing)* Well, I guess that fouls up your plans, colonel, but you know that's one thing you subordinate unit commanders have to expect.

(Regtl S-3 exits while the Bn Comdr stares at him angrily.)

SCENE III

(Scene opens in Regtl CP with the operations sergeant at his desk and the S-2 talking on the telephone.)

S-2. Operator, connect me with the PW Interrogator . . . Hello, Fritz, did you get anything?—Not too much, eh?—How about the swampy ground ahead?—No swamp—OK—send me the report as soon as you can. I'll hold this report about there being no swamp until you can verify it by the other prisoners.

(S-2 hangs up and S-1 enters hurriedly)

S-1. *(Excitedly)* Say S-2, the train bivouac got bombed a few minutes ago. I'm going in to tell the colonel.

S-2. What was the damage?

S-1. I didn't get that, I was just talking to the personnel officer back there, and he just said they were bombed.

S-2. Well, you better not mention it to the colonel until you get all the facts. He will only send you out to get them and get mad while he's waiting for a report. Anyway, what good is such news without the details?

S-1. Well, I guess you know him better than I do. I'll call the personnel officer again.

(S-3 and S-4 enter together)

S-3. Say S-4, the second battalion has lost two heavy machine guns and needs replacements right away.

S-4. Well, I have one, I'll notify them to pick it up the next time they have a truck at the regimental supply point. I'll have to get the other one from division.

S-3. OK—Say, you know it will be so late by the time we finally take Houston Hill, that I think we'll get orders to consolidate there for the night. I'm going to work out plans for doing that so I'll be ready if we hear from division anytime soon.

S-4. Yes, that's my guess, too. I've already given the battalions a release point for their kitchen and baggage trucks tonight. They'll get four trucks each. I'm waiting now to hear from the battalion S-4's on how they want them loaded.

S-2. I hear the train bivouac got bombed. What was the damage?

S-4. Very little, I don't think they knew what they were hitting. No one was hurt but the companies will have stew tonight instead of roast beef.

S-3. Don't you think that ammunition supply point is too far back from the front even though it is handy to that trail that goes by it? I think you'd better move it forward after the units resupply tonight.

S-4. *(Caustically)* That was my plan, too, but suppose you take care of your operations and let me handle supply.

S-3. OK—OK—I was just trying to keep you out of trouble.

(To S-2) Did anything of importance happen while I was out?

S-2. Oh, just a few minor items. I left notes on your desk showing everything that concerned you. You know,

it's been so quiet around here that I'm afraid something is going to happen.

S-3. Oh, no, everything is under control now that I'm back.

REGTL COMDR. *(Stomping onto stage—Loudly)*—S-3 —*(Everyone jumps to his feet)* Did you tell the second battalion that they could have one of my antitank platoons?

S-3. *(Hurriedly)* Yes sir, I've already seen the antitank company about that. The battalion commander was worried about his left flank, and frankly, so was I. I meant to tell you about it as soon as I got back and attended to a few details here in the office—

REGTL COMDR. *(Interrupting and very determined)* You can stop and listen to me for a few minutes. All of you come over here. Get that new liasion officer in here too. (S-2 calls Ln O No. 2 in) Now, S-3, who is running this regiment?

S-3. *(Very meekly)* Why you are, sir!

REGTL COMDR. Thank you. Now how in the hell can I run it if you issue orders that I haven't approved and don't even know about? In the first place, that completely fouls up my plans for the night. All of you listen closely to this. *(Operations sergeant exits)* There are a few things I want to point out to you. Most of you are pretty new here and have a lot to learn about staff work. In the future, none of you will issue an order in my name without the approval of the executive officer or myself. You have not worked with me long enough to know my policies. When you have, I can relax on that rule. Since I am responsible for everything you do, I must be certain that your actions will be in accordance with what I would do in the same situation. I do want each of you to develop team work and carry on normal operations in my name. That does not mean to infringe on the responsibilities of another section or to issue orders in my name without my approval. Remember, the staff is a team, and if you are playing first base,

you don't run over and play third or take my place as the team captain. And finally, don't get the feeling that this regiment is being run for the benefit of the regimental staff. The staff exists only for the benefit of the regiment. Is that clear, gentlemen?

ALL. Yes sir.

REGTL COMDR. Well, carry on.

(Regtl Comdr exits and dopey messenger enters)

S-2. Now look here messenger, you'd better not let the executive officer catch you in here again. Haven't you delivered that message yet?

MSGR. Nope, I can't now, the play is all over.

END

CHAPTER 7

The Theory and Operation of Military Government

The bulk of our armed forces are now stationed as occupation troops in support of military governments which we have established in the territories and in the homelands of the defeated nations. We have won the war; now our primary mission is to win the peace. A large percentage of our armed forces are now, or will be, detailed to assignment to overseas station for duty with occupational forces. In preparing for such assignment, it is essential that they understand the basic principles of the subject of military government, and the role and relationship which occupation troops bear to the military government which they support. Upon them devolves a great responsibility. As occupation troops, they represent to those people in occupied territories a living example of the United States of America. Our nation will be judged by their actions, their conduct, and the manner in which they discharge their duties. Officers will be held responsible that the troops by their conduct gain the respect of these people. It is intended here to reduce the problem to its simplest terms and to consider it as a purely military operation. Military government has all of the identifying characteristics of a military operation, i.e. it serves first to inflict our will on the enemy and it is operated entirely by the military establishment. The scope of this article is to present a broad outline of the subject, stressing its underlying principles; to bring to the reader a fundamental knowledge of the problems and responsibilities of military government and civil affairs and especially those problems with which our occupation troops are confronted.

DEFINITIONS

What is Military Government?

FM 27-5 states: The term military government is used to describe the Supreme Authority exercised by an armed force over the lands, property, and inhabitants of enemy territory, or allied or domestic territory recovered from enemy occupation; or from rebels treated as belligerents. It is exercised when an armed force has occupied such territory, whether by force or agreement, and has substituted its authority for that of the sovereign or a previous government.

Under international law a territory is considered occupied when it is actually placed under the authority of the hostile army and the extent of the occupation goes only so far as that authority can be exercised. For an occupation to be a fact, it must be physical. It presupposes a hostile invasion which renders the invaded government incapable of exercising its authority and the invader capable of substituting his own authority for that of the indigenous government in the territory.

The invading force has the right to exercise control only during the period of occupation. This does not transfer the sovereignty to the occupant, but simply that authority or power to exercise some of the sovereign rights. Defining of key words in the basic definition can be continued *ad infinitum*, so for practical purposes consider that the term military government implies *government by armed force in a foreign territory*. It is worthy of note that although during the greater part of the war the terms "military government" and "civil affairs" were used interchangeably, distinction is now drawn between the two terms:

Military government—That government established and maintained by the military commander in occupied enemy territory prior to its return to the independent authority of the indigenous government and the relinquishment of control by him, or in liberated or friendly territory where no

government is recognized by treaty, agreement, or course of action as having authority independent of the military commander.

Civil affairs—The relationships entered into and the responsibility assumed by a military commander with respect to the government and inhabitants of liberated or friendly territory in which an indigenous government is recognized by treaty, agreement, or course of action as having authority independent of the military commander.

ESTABLISHMENT OF MILITARY GOVERNMENT

An armed force may exercise control over civilians to a lesser degree than under military government through treaty or agreement with the government of an occupied territory. This agreement is usually made prior to entering the territory and is subject to modification by the government and the military commander as circumstances require. However, there are occasions which require the establishment of military government by an occupation force. These are: By reason of military necessity as a right under international law, or as an obligation under the same law. Military necessity may require an armed force to establish military government to assist in the accomplishment of its military mission. The right to do so is recognized in such cases by international law. Further, since the occupation of an enemy territory will temporarily suspend the operation of civil government, it is an obligation under international law for the occupying force to exercise the functions of the civil government in the restoration and maintenance of law and order. An armed force in territory other than that of an enemy is obligated to establish military government when the civil government is unable to maintain order. The establishment of military government, then, is both a right and an obligation under international law.

Careful analysis of the foregoing conditions indicates that military government is not confined to enemy occupation. Military necessity may require its establishment in

any of the following areas, *with or without the consent of the existing or prior government*:

(a) In allied or neutral territory which has been dominated or occupied by the enemy (our military government of Guam).

(b) In technically allied or neutral territory which is actually unfriendly or actively hostile (Vichy-controlled North Africa).

(c) In genuinely allied or neutral territory, the occupation of which is essential to military operations (Hawaiian Islands during the war).

(d) In domestic territory recovered from enemy occupation or from rebels treated as belligerents. (The military government in the Philippines during the period of liberation is one example; the military government established in the southern states at the end of the Civil War is another.)

Military government is a necessary consequence of waging war on a foreign soil where the incumbent government is hostile or is unwilling or unable to cooperate. It is created by the mere presence of our force in the occupied territory. No proclamation is necessary for its announcement, though a proclamation is customary. Proclamations will generally set forth the objectives toward which the occupying power will direct its efforts and the means by which these objectives are to be attained. Military government is usually expected to attain the following objectives:

(a) To assist military operations.

(b) To further national policies.

(c) To fulfill obligations under international law.

The first objective, to assist the military operations, receives primary consideration during combat. The other objectives are subordinated to promoting the security of the military force, preventing interference with our military operations, reducing active and passive sabotage, and the mobilization of local resources to aid operations.

The second, to further national policies, is usually the primary objective after the cessation of hostilities. Only then is it possible to systematically go about the business of

reorganizing the political, industrial, economic, and social activities of the occupied territory to bring them in line with the national policies of the occupying power.

The third and final objective, to fulfill obligations under international law, is the obligation the occupying power must shoulder and connotes taking over the civil government to maintain law and order in the absence of normal civil government which ceased to function upon occupation. This is a continuing objective, which must be carried out both during military operations and after the cessation of hostilities until government can be turned over to the reconstituted civil authorities in the occupied area.

CONTROL

Since military government implies and imposes a degree of control, an examination of this control appears to be in order. The first step in analysing this subject is to inquire into its authority. In addition to the legal authority found in international law, *authority is further derived from the mere fact of an occupation by troops.* A recent example of this course is the exercise of control by military government in Germany. The German army did not capitulate nor ask for a peace treaty, as a force. It was completely cut up and captured bit by bit. The civil government collapsed, and so by the mere fact of physical presence on German soil, Germany came under military government. Still further authority for control by military government may be granted by some form of agreement, such as an armistice, a convention, a treaty, or by terms of a surrender. The main armies of Japan were not defeated, nor the home islands invaded, but Japan surrendered unconditionally and thus every phase of Japan's national life was brought directly under control of military government in accordance with the terms of the Potsdam Ultimatum.

Military government exercises control whenever possible by retaining local officials in office, or by appointing new ones and requiring them to carry on the duties of the office under supervision of military government officials.

Military government will, in so far as possible, use the local police force to preserve order. However, it must be supported by the military forces, if necessary, by attachment of squads, platoons and companies of military police. If the problem of maintaining order still persists, or is of such nature that detachments cannot cope with it, then combatant units must be made available for this job. In this vein, it is a recognized fact that a display of military force has a strong psychological influence on peoples of occupied territory. Whatever system of maintaining law and order is applied, it must be backed up by an effective judicial system for punishment of offenders. (The nature and composition of a typical judicial system will be discussed in later paragraphs.) Thus far, this article has dealt with control and its authority. It is recognized that control and authority in turn must be controlled—that there must be a limit to the powers of any government.

The degree of control exercised by military government is determined by appropriate provisions of international law, which in brief states that an occupying force "may demand and enforce from the inhabitants of the occupied area such obedience as is necessary for the purposes of war, for the maintenance of law and order, and for the proper administration of civil functions in the area. In return for such obedience, the inhabitants should be granted freedom from all unnecessary and unwarranted interference with their personal liberties and property rights." Obviously, under law very little provision is made for the hapless civilian who finds himself in residence in the country which happened to lose the war. He may find some ray of hope, provided his Army has been fighting the United States, for there has been written in Article 300 of the *Rules of Land Warfare*, known as "The United States Rule": *The United States acknowledges and protects, in hostile countries occupied by them, religion and morality; the persons of the inhabitants, especially those of women; and the sacredness of domestic relations. Offenses to the contrary will be rigorously*

punished. The degree of control exercised by military government will be found to vary greatly, according to the relations which existed or exist between the government of the occupying force and the government of the occupied area. In enemy territory, it can be expected that there will be a rigid, iron-clad control. In neutral, allied, or domestic territories, cooperation from local officials and inhabitants may be obtained to such a degree as to permit a greater latitude of action by the local government under broader policies. In any territory, as conditions approach normal and the goals of national policies are achieved, the control exercised by military government will be relaxed, its supervision become less direct, and finally supreme authority will be turned over to the recognized sovereign power.

The matter of control gives rise to the question which is of great interest to soldiers, statesmen, and civilians alike—how long is it necessary to occupy a conquered territory?

Before any logical answer can be put forth to the question of period of control, the following factors must be considered:

Military necessity: The continuation of military operations in the area may require use of the area as a base for present or future operations.

National policy: Military government may extend as far beyond the period of operations as necessary to achieve the national policy toward which the military operations were directed. The control exercised by military government is a command responsibility, and is vested in the senior commander in the occupied area; usually the theater commander. As head of military government, this commander is vested with the title of military governor. He may delegate this title and authority to a subordinate commander, but will still bear the full responsibility for the conduct of military government. He cannot delegate this responsibility and so by virtue of his position has supreme executive, legislative, and judiciary authority over his area. There are but two basic limitations placed on the military governor—the laws and customs of war, and directives from his superiors. This second limitation is self-descriptive, but the

first requires some amplification. The laws and customs of war are a part of international law, which consists of both written and unwritten laws. The written laws are contained in treaties and conventions to which various nations are signatories. The outstanding modern examples of these are the Hague Convention of 1907, and the Geneva Convention of 1929. The unwritten laws are those that are well established down through history through customs and usage, and are recognized by all civilized nations.

Responsibility for military government may be divided—that is, exercised by Army or Navy forces or jointly by both. In general, it can be expected that the Army will be given responsibility over continental areas, while the responsibility in island areas and over ports will be delegated to the Navy. This is not a fixed rule, and usually the service which has the paramount interest in the area will be given the responsibility for its control. The foregoing principles of responsibility will govern in the case of two or more allied nations. Their respective zones of responsibility within an occupied territory will be determined jointly by the chiefs of state or other representatives of the occupying nations. For example, the Combined Chiefs of Staff of the United States and Great Britain were concerned with the military governments established in North Africa and Italy. In Germany, the initial zones of occupation and the general policies to be followed by military government in those zones were set forth in a *Declaration of Occupation,* signed in Berlin, on 5 June 1945, by the senior military commanders of the United States, Great Britain, Russia, and France. The principles set forth in this document were later confirmed in the Potsdam Declaration of 2 August 1945, and signed by President Truman, Prime Minister Attlee, and Premier Stalin.

CIVIL AFFAIRS

In the functioning of military government there are certain matters which properly fall into the descriptive category of civil affairs. As used in military government operation, the term is applied to those activities of an occupied

area and of its inhabitants which are controlled by military government. Futher, they are activities which are, for the most part, the functions of any civil government.

Following are a few civil affairs activities, which serve to illustrate the necessity for control by military government:

The maintenance of law and order—includes the prevention, detection, and punishment of crime; the security of persons and property; fire prevention; the regulation of relations between the occupying force and the inhabitants of the occupied area; the establishment of military commissions and provost courts and their jurisdiction and procedure; the use of local courts; and the modification, as necessary, of existing laws.

Public health and sanitation—includes the supervision of medical services and hospitals; protection of food and water supplies; and the disposal of sewage and waste.

Communications—control over all forms, such as radio, telegraph, telephone, cable, and postal; the installation of censorship over all communication facilities.

Transportation—regulation of traffic on railroads, airways, steamships, trucks, and busses.

Public Utilities—includes restoration, operation, and control of all power, light, and heating facilities.

Money and Banking—includes closing of all banks, securing of all bank deposits, securities and other financial records; the designation of types of currency and establishment of rates of exchange; and supervision of tax collections and other public revenue.

Price control and rationing—includes supervision of the distribution of food and similar commodities and the control of prices; the prevention of hoarding and black marketing; and the stimulation of local production.

Agriculture, industry, and manufacturing—includes the development, encouragement and supervision of these to satisfy military and civilian needs.

Labor, education, and public welfare—includes the procurement of labor; the prevention of abnormal wages; supervision of the educational system and prevention of

harmful and subversive instruction; supervision of public and private institutions for the care of children, the aged, and infirm.

These are only a few of the many civil affairs which are controlled under military government, and it is apparent that they are normal activities that any civil government would be concerned with. A reference to civil affairs control is, then, simply a description of the control that military government exercises over these civil affairs. To perform these functions, civil affairs officers are designated to serve under the military governor of the occupied territory.

MILTARY GOVERNMENT AGENCIES OF WAR AND NAVY DEPARTMENTS

The military agencies designated by the Secretaries of War and Navy to plan and formulate policies for the operation of military government organizations are: For the War Deparment, the Civil Affairs Division, and for the Navy, the Office for Occupied Areas.

The Civil Affairs Division, in the office of the Chief of Staff, informs and advises the Secretary of War on all matters within the scope of the War Department, other than those of a purely military nature, which occur within the occupied areas as a result of military occupation.

Under general policies established by the Civil Affairs Division, the selection and training of civil affairs personnel is conducted under the supervision of the Provost Marshal General. During the recent war, a Civil Affairs School was in operation at Charlottesville, Virginia, and some 4,000 officers were trained there. Later, as the demand for civil affairs specialists diminished, a short course was established at Carlisle Barracks, Pennsylvania, to furnish the necessary replacements.

The Office for Occupied Areas is directly under the Chief of Naval Operations. It is charged with the planning and training of personnel, and the procurement of necessary equipment for military government establishments in areas controlled by the Navy. It also must coordinate with the

Civil Affairs Division of the War Department in areas of joint responsibility.

Stemming from these top level agencies are the far-flung military government organizations in various theaters of occupation. In general, the organization for civil affairs control within the theater will depend upon the mission of the theater commander, the organization of the military forces in the area, and the military situation.

From the foregoing it might appear that it is an impossibility to work out in advance a sound military government organization for a given area. However, the following two basic types of Military Government have served exceedingly well for planning purposes:

Operational Type—This type, as its name implies, follows the tactical and administrative chain of command and provides unity of command at the top level of the organization (see figure 28). The theater commander is also the

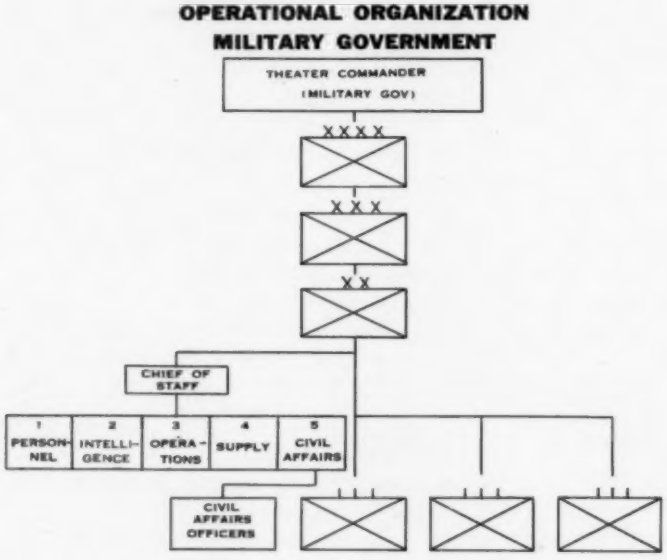


FIGURE 28.

military governor. But his power and the exercise of authority passes right down through the chain of command to his combat commanders, to those individuals who are actively engaged in the exercise of control over civil affairs.

Territorial Organization—In this type of organization, the military government structure is separate and distinct from the combat or occupation troops and has its own separate chain of command (see figure 29). The primary considerations in this organization are not tactical as with the operational type, but rather political and geographical. The civial affairs organization is flexible and is fitted permanently to needs of the occupied territory by the assignment of civil affairs teams to the various towns, cities, states, etc., of the occupied territory. These teams are permanently assigned to a definite location, and so far as possible, will fit the local government department by department.

TERRITORIAL ORGANIZATION

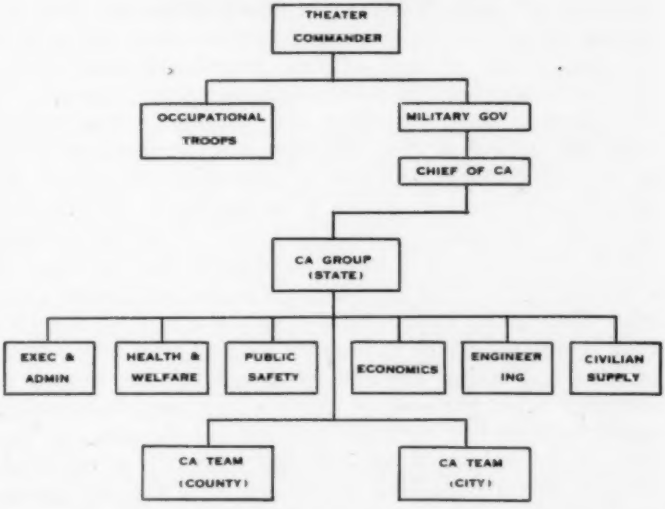


FIGURE 29.

Both of these types have been used by the armed forces in the past war, with some modifications to fit the needs in a particular area. In several instances, some of the features of both types were employed simultaneously. Generally speaking, in the early stages of an invasion the operational type must be used. As the battle pushes inland or deeper into enemy territory, it can be expected that conditions in the rear areas will become somewhat stabilized and the territorial type can be put into effect. Such procedure was used in the Italian Campaign. In the active combat zone, an operational type of military government was used, while in the rear areas, the territoral type was set up. As the battle lines pushed further up the peninsula, the territorial organization kept advancing to take over the liberated areas.

Each of these two types of organization has certain advantages and disadvantages. The principal advantage of the operational type is that all control, both tactical and civil affairs, is centered in one commander.

The principle disadvantages are that small unit commanders are more likely to be more concerned with the tactical employment of their units and are prone to overlook the importance of civil affairs control and the definite relation it bears on the political and economic objectives of the operation itself. Another disadvantage is that combat units are subject to frequent changes in location, resulting in just as frequent changes of personnel assigned to administer civil affairs within a certain area. This results in a lack of continuity within that area. This disadvantage can be minimized to a limited extent by leaving the civil affairs officer in that area to join the staff of the relieving unit. This is an unsatisfactory solution in that it means that commanders are constantly getting new civil affairs officers and losing the ones with whom they have been working. Also, the area in which a unit may be operating might include two or more political subdivisions, so that the commander would have to deal with two or more sets of local officials. Combat troops are not ordinarily trained for civil affairs control duties, and this work certainly requires a host of especially trained personnel. Last, the

superimposing of these additional duties on the combat troops necessarily restricts their freedom of action—their ability to pick up and go.

On the other hand, many of the disadvantages of the operational organization are overcome in the territorial type. For example:

(1) The civil affairs personnel are especially trained for their duties.

(2) Once having been assigned to an area they remain in that area, which results in a continuity of policy and functioning.

(3) It frees the combat troops for purely military duties, except as they may be needed in cases of emergency to maintain order.

(4) As conditions become stabilized, it is more effective and economical in the use of personnel.

(5) Lastly, and probably most important, this type, as the name implies, is more efficient for civil affairs control. Each detachment is so organized and equipped that it can control the civil affairs within a particular area. This area will normally be a political subdivision of the territory so that the detachment or group will deal progressively with the same set of local officials.

An interesting variation of these two types of organizations for military government was used in the combat stages of the late war in the European Theater of Operations. It progressed from the purely operational type to a modified operational-territorial type, where control by the combat units was gradually relinquished to the Commanding General, Communications Zone under the theater commander. In the early phases of combat in the European Theater of Operations, the operational type organization for military government was employed. On each staff from theater headquarters down through communications zone, army, corps, and division, each had its civil affairs section set up as G-5 on the general staff. In addition, based on prior estimates of the requirements for civil affairs detachments and teams during the initial operations, theater established a civil affairs pool where necessary personnel were assigned.

Prior to any given operation, theater attached to army, based on their estimates, a number of these teams and detachments. Army then attached some of these teams to divisions and, likewise, division attached spearhead detachments to regiments.

As regiments moved into an area, these spearhead detachments went in with them and immediately set up civil affairs control in the area. When the regiments moved on, the spearhead detachments moved with them, setting up control in the new areas. Based on requirements found by the spearhead detachments in progressive areas, division obtained from the corps civil affairs pool additional detachments to take over the control in those areas. These detachments then came under division control. In turn these detachments came under corps and army control until the rear boundary of army service area moved ahead of them. At that time they came under control of the Commanding General, Communications Zone.

All theaters attempted to provide for what appeared to be over-specialization in small detachments and the civil affairs staff sections. This, of course, unduly complicated the problem of procurement and assignment of personnel. Experience has shown that in small detachments and staff sections, the personnel must be trained as jacks-of-all-trades.

Having analyzed what might be called the operational types used during hostilities, this study progresses to the present organization for military government as it exists in the two principal theaters of occupation, Europe and the Pacific.

In Europe, there exists a complication of four great powers in control of the military government in the occupied territories. A *Declaration of Occupation* was drawn up and signed by the four senior commanders for the United States, Great Britain, Russia, and France outlining the zones of responsibility and the general policies to be adopted by military government. It was agreed that an allied council

would be established during the period of Germany's unconditional surrender. This council consists of the senior commander of each of the four great powers of their representatives, and has over-all responsibility for the control of Germany as a whole. The council must agree unanimously on matters affecting all four nations before they may be adopted. Concerning zones of responsibility, Germany, within her boundaries as they existed on December 31, 1937, is divided for purposes of occupation into four zones, and each zone is allotted to one of the four major powers. The geographic set-up is about as follows:

The Eastern Zone to the USSR.
The Southwestern Zone to the United States.
The Northwestern Zone to the United Kingdom.
The Western Zone to France.

The occupation forces in each zone as well as the military government are under the command of the supreme commander for the allied power responsible for that zone. Each of the four powers may include, at its discretion, among its forces assigned for the occupation of its zone, auxiliary forces of any other allied power which actively participated in military operations against Germany.

The area known as "Greater Berlin" is also occupied by forces of each of the four powers (see figure 30). An interallied governing authority consisting of four commandants, appointed by the commanders-in-chief of each of the allied powers, has been established to direct jointly the adminintration of the city. The chairmanship of this commandant authority is rotated each month between the four powers.

In the American zone of Germany, the over-all authority is vested in the Commanding General USFET, with headquarters at Berlin. He commands the occupation forces and is also the military governor. He is one of the four permanent members of the Allied Control Council, and is responsible for coordination with the council. It is significant that under this structure of command there exists in Germany today a territorial type of military government. The occupation troops are entirely separate from the military government structure. The American zone is divided into

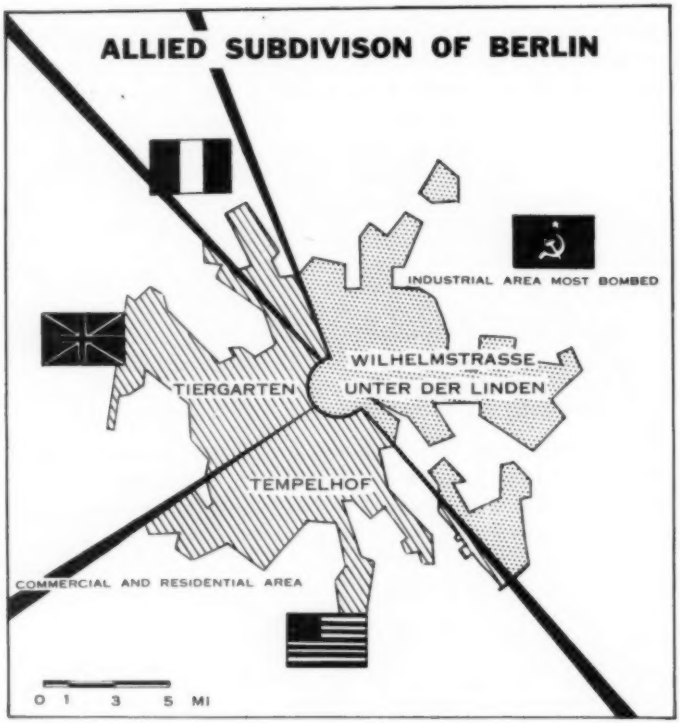


FIGURE 30.

three separate states—*Greater Hesse, Werttemberg-Baden,* and *Bavaria,* each under a deputy military governor (see figure 31). In each state there is a military government detachment; teams are allocated to cities and counties. At present, local governments have been elected in all cities and up to and including the state governments. Military government serves in a supervisory capacity in these areas.

BREMEN
ENCLAVE
(AMERICAN AND
BRITISH CONTROL)
BRITISH ZONE
JOINT ADMINISTRATION
BERLIN
USSR ZONE
WESTERN
MILITARY
DISTRICT
HEIDELBERG
EASTERN
UNITED STATES ZONE
MILITARY
FRENCH ZONE
DISTRICT
MUNCHEN
U S S R ZONE
U S ZONE
JOINT ADMIN.
VIENNA
SALZBURG
BRITISH ZONE

FIGURE 31.

ASIATIC

The military occupation and establishment of military government in Japan and Korea is necessarily different from that in Europe. First, the occupation of Japan was different physically from that of Germany, in that our occupation of Japan was not by force of arms, but as a result of surrender terms. Military government control in Japan is also different due to the fact that it is not complicated by joint power control as is the case in Europe. Nevertheless, because of the multiplicity of agreements and treaties, the military government structure is somewhat involved. (See figure 32.)

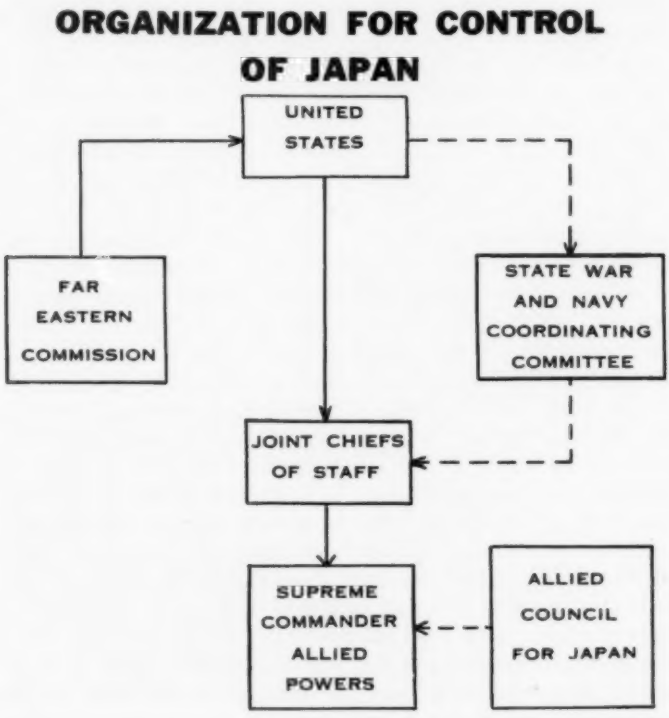

ORGANIZATION FOR CONTROL OF JAPAN
UNITED STATES
FAR EASTERN COMMISSION
STATE WAR AND NAVY COORDINATING COMMITTEE
JOINT CHIEFS OF STAFF
SUPREME COMMANDER ALLIED POWERS
ALLIED COUNCIL FOR JAPAN

FIGURE 32.

The key to this complicated structure is found in the system of control exercised. Control in this instance, originated with the Far Eastern Commission, which has its headquarters in Washington. This body, consisting of members and personal staffs of all of the United Nations having interest in the Far East, formulates policies, principles and standards to be used in Japan. It may review, upon request of any member, directives issued by the Supreme Commander Allied Powers. The findings and recommendations of the commission are then sent to the President of the United States, who has what might be termed ambiguous veto powers. He is the governing power in the control organization. He may approve the actions of the Far Eastern Commission in whole or in part. If he approves, he sends the directives to the Joint Chiefs of Staff, who transmit them to SCAP for compliance. Next in the chain of control bodies is the Allied Council for Japan, an advisory body composed of representatives of the U. S., Russia, Great Britain, and China. The Supreme Commander Allied Powers is chairman of this council, which sits in Tokyo and ostensibly has the right to call a postponement on any important decisions made by SCAP. In actual practice, this body has functioned in an advisory capacity only. The actual structure of military government in Japan differs radically in several respects from that of Germany. In Germany the entire civil government was suspended because of its Nazi affiliations. In Japan, the central and local governments were in the main, acceptable by United States standards for the occupation. Certain minor revisions were found necessary, but on the whole the present government is the same as existed prior to occupation. In the functioning of military government in Japan, action on any matter commences with the receipt by SCAP of directives from the Joint Chiefs of Staff. These are submitted to the staff of SCAP for study, and after clearing are transmitted to the central liaison office, which is composed of representatives from the various departments and bureaus of the central government. Here the directives are translated and sent to the appropriate government agency which is expected to carry

out the provisions of the directive. The Supreme Commander Allied Powers, General of the Army, Douglas MacArthur, is also designated as Commanding General Armed Forces in the Pacific. The major components of his command consist of the XXIV Corps which is in occupation of Korea, the 5th Air Force, which has no occupation duty as such, and the 8th Army in occupation of Japan proper. Though military government in this area seems to exercise its control wholly through the established civil government, it has been found necessary to delegate military government personnel down to the occupation troops to see that policies and directives transmitted by SCAP are being complied with. In this respect, the organization appears to be a combination of operational and territorial forms of military government.

Korea, which is jointly occupied by the United States and Russia, is a separate military government establishment. (See figure 33) In the American Zone, the occupation forces and military government are under the direct command of The Commanding General, XXIV Corps. Further there have been appointed a military governor and a civil administrator to assist him. In Korea, the occupation troops are entirely separate from the military government establishment and so there exists a territorial structure. The Korean Advisory Council consists of United States, Russian, and Chinese representatives and acts in much he same capacity as the Allied Council for Japan. The civil administrator controls the activities of the three military government groups which administer separate areas with the U. S. zone of occupation. Under this group are the civil affairs teams which are placed in the various towns and cities. In Korea, which is actually a liberated territory, it has been necessary to set up local civil governments because the former civil officials were either Japanese or "puppet" officials controlled by Japan.

NATIONAL POLICY

Prior to World War II, determination of national policy regarding occupied territories was a comparatively simple matter. Occupation was considered as a natural consequence

MILITARY GOVERNMENT ORGANIZATION IN KOREA

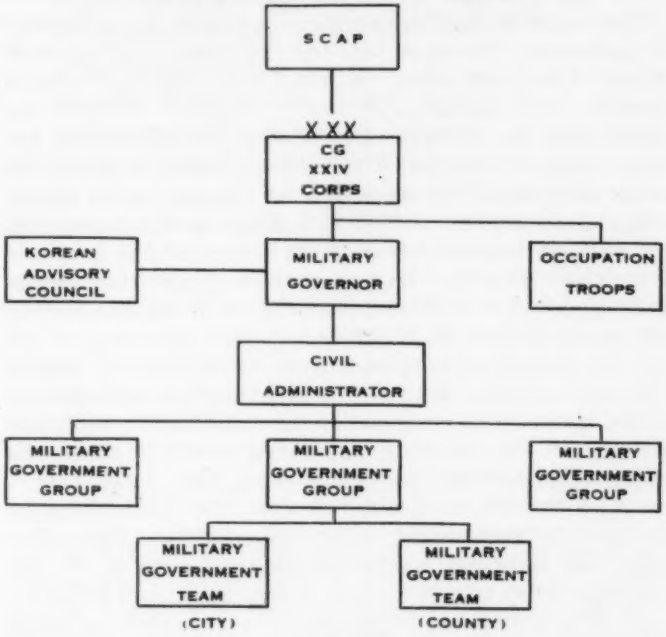


FIGURE 33.

of conflict, either military or political, and a burden or a privilege, depending on the philosophy of the conqueror. Under the old concepts of occupation, the victor moved into the conquered territory and proceeded to exact reparations, inflict his wishes on the subjugated populace, and generally operated pretty much at his own pleasure. When satisfied that the territory was completely subjugated, and that threat of aggression had been nullified, it was time to terminate the occupation, withdraw the troops, and leave the people of the country to shift for themselves. No attempt was made to change the political or social structure of the country for any considerable period of time. That this system did not work too well is best evidenced by the

results of the Allied occupation of Germany following World War I. Germany, after 1922 was for all practical considerations, left to her own devices.

This meant to the German nation a resurgence of a policy of aggression, the secret building of an army and a powerful air force, and when the time was considered ripe, a renewal of a campaign of world conquest. History has shown that the German nation, led by its militaristic elements personified in the German General Staff, regarded the years following a war as simply an interim period during which to prepare for another war. Based on this experience, and with an understanding of the nature of the enemy, a new concept of policy has been evolved. Under this concept an occupying nation must undertake not merely to occupy, not merely to govern, but to change the entire way of life and the entire political philosophy of millions of people. The national policy of the United States, to be implemented by its occupational organization, is committed to removing for all time the threat of aggression to the peace of the world. This national policy has been formulated over a period of time and as a result of a series of conferences by the chiefs of government of the Allied Powers. Occupation policy for Germany was determined at a series of conferences, the most important of which were the following:

(1) The Crimean Conference, February 1945, attended by chiefs of government of the United States, Great Britain, and Russia.

(2) The Tripartite Conference, Berlin, in June 1945.

(3) The Potsdam Conference, July 1945.

The findings and agreements of these conferences were announced as representing the unanimous decisions on plans and policies. The complete text of these agreements represents several hundred pages of reading, but in brief the principle aims of occupation are as follows:

Unconditional surrender of Germany.

Complete disarmament and demilitarization of Germany.

Dissolution for all time of the German General Staff.

Destruction of the Nazi Party.

Reconstruction of German political life on a democratic basis.

Apprehension and punishment of war criminals.

Elimination of Nazis from public office.

Control of education.

Reorganization of the judicial system.

Administration of affairs in Germany.

Freedom of speech, press, and religion.

Policy with regard to occupation of Japan was determined in a similar manner, that is, by conferences between the interested Allied Powers. Briefly, the chief developments in working out this policy resulted from two significant conclaves: The Cairo Conference of November 1943, resulting in the Cairo Declaration, and the Potsdam Conference of July 1945, which resulted in the Potsdam Ultimatum, the provisions of which were accepted by Japan in the instrument of surrender signed on September 2, 1945 aboard the USS Missouri in Tokyo Bay.

The high lights of occupational policy for Japan are as follows:

(1) Japan shall be stripped of all the islands of the Pacific which she has seized or occupied since the beginning of the first World War in 1914, and all the territories Japan has stolen from the Chinese such as Manchuria, Formosa, and the Pescadores, shall be restored to the Republic of China. Japan will also be expelled from all other territories which she has taken by violence and greed. In due course Korea shall become free and independent.

(2) There must be eliminated for all time the authority and influence of those who have deceived and misled the people of Japan into embarking on world conquest. Until such a new order is established and until there is convincing proof that Japan's war-making power is destroyed, points in Japanese territory to be designated shall be occupied to secure the achievement of the basic objectives set forth.

(3) Japanese sovereignty shall be limited to the islands of Honshu, Hokkaido, Kyushu, Shikoku, and such other minor islands as will be determined.

(4) The Japanese military forces, after being completely disarmed, are permitted to return to their homes with the opportunity to lead peaceful and productive lives.

(5) The Japanese shall not be enslaved as a race, or destroyed as a nation, but stern justice shall be meted out to all war criminals, including those who have inflicted cruelties on Allied prisoners. The Japanese government will remove all obstacles to the revival and strengthening of democratic tendencies among the people. Freedom of speech, religion, and thought, as well as respect for the fundamental human rights, shall be established.

(6) Japan shall be permitted to maintain such industries as will sustain her economy and permit the exaction of just reparations in kind, but not those which would enable her to re-arm for war. To this end, access to, as distinguished from control of, raw materials shall be permitted. Eventual Japanese participation in world trade relation shall be permitted.

(7) The occupying forces of the United States shall be withdrawn from Japan as soon as these objectives have been accomplished and there has been established, in accordance with the freely expressed will of the Japanese people, a peacefully inclined and responsible government.

These are the policies and principles determined—How does military government implement these policies in Germany and Japan? It is largely accomplished through the system of civil affairs control. Following are some of the problems posed in civil affairs control with a description of how the problems have been solved by the civil affairs organization:

First in magnitude is the problem of destruction of the Nazi party and removal of the Nazi influence from the national life of Germany. To accomplish this purpose, early in January 1946, there was created a unit known as the United States de-Nazification Policy Board. This was a group of military government officers appointed by the theater commander to study the problem and plan a program of correction.

The first step in de-Nazification is classification by categories. To accomplish this, every German national was ordered to register with his local military government office. This job of registration was somewhat easier than had been anticipated due to the fact that for many years every adult in Germany had been required to register with the police, and his registration included a statement as to political beliefs and affiliations. The bulk of the records maintained under this registration were made available to military government, and were of tremendous help in analyzing the Nazi problem.

After registration had been accomplished, the next step was to classify Nazis according to category. All Germans were placed in one of four main categories, somewhat as follows:

Class I —Leaders.
Class II —Active, militarist, profiteers.
Class III—Followers.
Class IV—Non offenders, non members of Nazi party, or active opponents of Naziism.

In bringing these various categories to trial and punishment where indicated, the fundamental principle is that the burden of proof rests upon the German people; the burden of enforcement and punishment is also charged to them.

Proceeding further with the program of de-Nazification, the next step was to set up the judicial machinery for trial and punishment. In each *land* (county), there was designated a de-Nazification minister. This office is filled from the populace of the area, and the incumbent is selected for his qualities of trustworthiness, and opposition to the Nazi party, and is preferably a person of some standing in the community. This minister is required to appoint a de-Nazification tribunal, to consist of three reliable non-Nazi residents of the community. This tribunal conducts the trial of persons brought before it accused under one of the first three categories listed above. Detailed to the court by the local military government office is a special prosecutor, whose job is to present the case against the accused. The accused is allowed to be represented by defense counsel, and

if he cannot obtain counsel of his own choice, an officer of the occupying power may be detailed to act as defense counsel. If the accused can produce evidence to prove that he does not belong in the category to which assigned during the preliminary investigation, he may be placed in a lower category.

After a finding of guilt, the accused is sentenced by the tribunal. For conviction under the first and second categories, mandatory punishments are prescribed by military government, and the tribunal has only to announce the degree of punishment selected. These punishments range from confinement at hard labor in German labor camps, to deprivation of right to own or control any business and restriction to common labor as a means of livelihood.

For Class III, mandatory punishments are not prescribed, but rather the sentence is left to the judgment of the tribunal, subject of course, to approval by the theater commander.

The foregoing describes the system presently in force for accomplishment of de-Nazification in Germany. In Japan there was no problem comparable to that of Germany. However, in Japan a counterpart of the Nazi was found in the military leaders of the country. Certain public officials, cabinet ministers, the Imperial General Staff and other elements who had led the Japanese people into a program of aggression against the other nations of the world, were condemned by the new concept of international law which embraced those considered liable to punishment for crimes against humanity—the war criminals. To deal with these people, shortly after the commencement of occupation, lists were published of certain persons to be removed from public office and detained for trial as directed by SCAP. It is hoped that after removal and punishment of this element in the national life that the mass of the people can be influenced to a new political and social philosophy and reform of their governmental structure.

TREATMENT OF POPULACE

It is a fundamental principle that military government may very well stand or fall by the way in which the problem

of treatment of the populace is met. The basic policy of the United States, in this respect, provides for absolute equality of treatment of all of the people of an occupied territory, regardless of any former social position or political standing. Naturally, treatment of large sections of the populace will vary in different areas. In this connection, the people of Japan are generally considered more amenable to military government because of their docility and strong herd instinct than those of Germany. The local commanders of occupation troops will be influenced in their treatment of the populace by the temperament of the people, their reputation for maintenance of law and order, and general past behavior. It is apparent that this problem will require considerable study of the people concerned, and must not be influenced by prejudices growing out of the late war.

LOCAL OFFICIALS

The next most serious problem to date has been in the matter of local officials. In the approach to this problem there are several factors to be considered. The public offices must continue to function in the interest of government. The existing policy is that, where possible, indigenous officials will be retained in office so as to reduce to a minimum the disruption of the life of the community. In the case of former active Nazis or Japanese militarists, they must be removed from office. The restraining factor in this matter is that such removals in themselves present a personnel problem. If an incumbent is removed from office, there are two sources from which the office may be filled. The first and most desirable, is to find a suitable substitute within the civil populace of the community. Second, a suitable substitute may be appointed from the occupying force. Obviously, the latter solution is manifestly undesirable.

ECONOMICS

The economic policy of the United States in occupied territories is stated as follows: "To revive economic life and stimulate production so as to reduce to a minimum the need for assistance." Thus the concern of the occupying

force is supervision, not execution. It has been bluntly stated to the peoples of Germany and Japan that their present economic plight and the threat of starvation is the result of their own wrong doing. They have brought this misery upon themselves. The responsibility for the restoration of their economic life is placed on the people. To further this restoration there will be found in the organization of civil affairs detachments certain technical experts whose job is to advise and assist where necessary, the local authorities in the rehabilitation of industry and agriculture. By restoring essential industry and stimulating agricultural production the inhabitants may attain a degree of economic self-sufficiency.

POLITICAL ACTIVITY

In the early stages of the present occupation, it was a basic principle in both Germany and Japan that no political activity of any nature would be permitted. The reasons motivating this prohibition are obvious. The political activity and leadership of both countries had been proven irresponsible. Their political doctrines were not only contrary to United States concepts, but actually presented a serious threat to the peace of the world. As occupation progressed it became apparent that limited political activity among the people was in itself a desirable element. Occupation is not intended to last forever and eventually the people of occupied territories must find among themselves, a responsible political leadership. Again the job is one of supervision. The people must shoulder the responsibility for reconstruction of their political life and prove themselves capable of working out a government along democratic lines. To this end there have been permitted low-level elections in both countries during recent months. It is as yet too early to be able to assess the degree of success or failure of this political activity, but time will tell to what extent these people can be expected to become capable of governing themselves. Military government still retains a control, in that any and all officials placed in office as a

result of these elections will hold office at the pleasure of the theater commander and are subject to removal at any time at his discretion.

RELIGION

Civil affairs is also concerned with the religious life of the community. It is recognized that religion and its practice are an essential part of the life of any community. Further, it is a fundamental principle in the conduct of civil affairs that the occupier must respect the inclinations of the individual as to religious preference. To supervise the religious practices of the occupied territories there have been designated certain religious affairs officers.

These are Army or Navy chaplains who maintain liaison with the clergy of the community and coordinate and assist them in the restoration of the spiritual life of the community. In general, religious activity is entirely unhampered except as necessary in the interests of order and security. For example, at the outset of our occupation of Japan, SCAP ordered that Shinto be abolished as a state religion. This did not in any way prohibit any individual from practicing or professing belief in Shinto, so long as it was purely a religious belief, and had no political significance or influence on the government. In Germany, complete freedom of religious worship is permitted. At the beginning of the occupation it was forbidden for more than five adults to congregate at any one place at any given time. This order was soon relaxed to permit assembly for religious services. As a safety measure, it is the practice for the local commander to supervise religious service by having a representative designated to attend these services as a spot check. This representative will listen to sermons and watch for evidence of political activity and report any indication that religious services are being used as a front for subversive activities.

JUDICIAL

At the entrance to any Federal courthouse in the United States is found the inscription: "The firmest pillar of good government lies in the true administration of justice." In

occupied territory, this might be paraphrased to read: "The firmest implement of military government lies in the true and impartial administration of justice." Without becoming involved in the legal ramifications, an examination into the system of administering justice in occupied territory is in order. It has been stated previously that the theater commander has supreme executive, legislative, and judiciary authority. It follows that he must administer and supervise, through his civil affairs organization, the judicial system and its functioning in his zone of responsibilty. To determine his authority it is well to understand the sources and type of law with which the judicial system will be concerned. Basically, there are two sources of law in occupied territory. First, the existing law of the land, as previously written and administered. This legal code is retained as far as possible, since it can be assumed that when this legal code was drafted, it was considered suitable and particularly applicable to the community and to its people, and if it is free from prejudice and discrimination, can continue to serve the purpose for which it was adopted. It may be found necessary to make certain changes in the existing legal code for the benefit of the people and to expedite the interests of the occupation. To this end, the initial proclamation from the Supreme Commander European Theater of Operations to the people of Germany declared that: "All cruel, discriminatory, and oppressive laws of the Nazi Government are abolished." This type of action is discretionary with the theater commander.

The other source of law is found in the proclamations, orders and directives of the theater commander, enforced through his civil affairs administration. Effective upon their issuance they become valid law as far as the populace are concerned, and any violation of them is punishable by law. When a law is violated, the judicial system brings the offender to trial and punishment. For this purpose, military and civil courts are set up to function under control of the military government.

MILITARY COURTS

As soon as practicable after declaration of an occupation, military courts will be appointed by the theater commander. These are of two principal types—first, the provost court consisting of one officer possessing legal training and experience. This court tries minor offenses against military government such as violations of curfew, petty larcenies, sanitary violations, and other trifling offenses violating orders and proclamations of military government. A prosecutor is appointed to serve with this court for the purpose of presenting the case and evidence against the accused. Provision is also made to appoint counsel to represent the accused in the event he cannot obtain counsel of his own choice.

The other type of military court is called a military commission. It consists of not less than three nor more than thirteen members. The military commission is constructed somewhat along the lines of a general court-martial. For example, there is a law member with duties and powers similar to the law member of a general court to facilitate procedure and promote sound legal decisions. Further, there is provided a trial judge advocate and defense counsel. The military commission is empowered to try the more serious type of offense such as murder, rape, and greater degrees of larceny. Also, it has power to try war criminals.

The jurisdiction of military courts extends to all persons in occupied territory except members of the Armed Forces who are tried by court-martial.

It may be of interest in this connection to note that dependents of members of the Armed Forces are subject to trial by military courts as with other civil residents of the area.

CIVIL COURTS

If the local civil courts are open and functioning satisfactorily, they are permitted to continue to try civil cases. The theater commander reserves the right to supervise these courts, to review their proceedings, and he may abrogate

or cancel any part of their proceedings and findings. If it appears that such courts are not administering justice or are discriminatory or oppressive, he may abolish the court and appoint a new court to try the unfinished case or cases.

SUMMARY

Military government is a *right* and an *obligation* under international law. It exercises supreme authority by armed force over the lands, property, and inhabitants of an enemy territory, and becomes fact when an armed force has occupied such territory, whether by force or agreement. A territory is considered occupied when it is actually placed under the authority of the hostile army, and for an occupation to be a fact, it must be physical. Military government is a substitute for the indigenous government, and is applied when it is apparent that such former government is unwilling or unable to exercise its powers.

Supreme authority in the military government structure is vested in the theater commander who is also designated as military governor of the occupied territory. He may delegate this title and its authority, but must retain the responsibility. Certain of the functions of military government by their very nature are classed as civil affairs. However, military government is the agency which exercises control over them.

The primary objectives of military government are:

a. During hostilities, to assist military operations.

b. After cessation of hostilities, to further national policies of the occupying force.

c. To fulfill obligations under international law.

Military Government will exercise its control only during the period of occupation and until authority is restored to the sovereign power in the occupied territory.

CHAPTER 8

The Airborne Pathfinder Team —Point of the Spearhead

During World War II, combat operations involving airborne units thoroughly demonstrated the absolute necessity for the utilization of specially equipped teams to guide cargo type aircraft directly to pinpoint locations to facilitate delivery of airborne troops, airlanded troops, and supplies. Airborne Pathfinder Teams were organized within each airborne battalion to perform this mission. These pathfinder troops spearheaded every airborne operation staged on the continent of Europe and were dropped to many units to facilitate resupply by air. Probably the most successful pathfinder operation was made during the drop in Holland. There, with excellent help from the air corps in navigation, the teams were pinpointed on their drop zone (DZ) while the planes slowed down to 90-100 mph for the jump. The most successful of the resupply misssions was performed by the two teams dropped inside the perimeter at Bastogne for resupply of the 101st Airborne Division during the Battle of the Bulge.

MISSION

The primary mission of the Pathfinder Team is to precede the main body by fifteen minutes to one hour, land by parachute on the assigned drop zone (or landing zone), and establish radio, radar, and visual navigational aids to guide the troop carrier aircraft to the drop zone for the delivery of the airborne assault troops. These teams may be employed for reconnaissance of proposed airstrips, reporting by radio directly to the air corps unit contemplating the use of the strip.

FIGURE 34.—Pathfinder prepared for exit from plane with equipment bundle.

ORGANIZATION

Airborne Pathfinder Teams are organized on the basis of one team, consisting of one officer and nine enlisted men, for each airborne battalion (see figure 35). Additional personnel from the parent organization may be attached to the team to provide security. For example, a Pathfinder Team assigned to perform a mission in an area known to be within striking distance of enemy armor, might have a

FIGURE 35.—Pathfinder team with equipment prior to emplaning. (All equipment with the exception of the LMG is duplicated to take care of loss during the jump.)

PATHFINDER TEAM EQUIPMENT FOR DAY OPERATION

NAVIGATIONAL AIDS

OFFICER (LEADER)	S/SGT	SGT	SGT	CPL
1 AN/TRC-7	1 AN/TRC-7	1 AN/PPN-2	1 AN/CRN-4	1 AN/PPN-2
TOTAL ADDITIONAL JUMPING WEIGHT 100 LBS	100 LBS	33 LBS	54 LBS	33 LBS

	VISUAL AIDS			SECURITY
SGT	CPL	CPL	CPL	CPL
8 PANELS	25 ADDITIONAL SMOKE GRENADES	8 PANELS	1 AN/CRN-4	1 .30 CAL LMG
TOTAL ADDITIONAL JUMPING WEIGHT 44 LBS	57 LBS	44 LBS	54 LBS	100 LBS

ALL PERSONNEL EQUIPPED WITH LENSATIC COMPASS AND WRIST WATCH. OFFICER AND S/SGT EQUIPPED WITH 10-POWER BINOCULARS. ALL PERSONNEL, EXCEPT CORPORAL, MACHINE GUNNER, ARE ARMED WITH .45 CALIBER SUB-MACHINE GUN, .45 CALIBER PISTOL, 184 ROUNDS .45 CALIBER AMMUNITION, TWO HAND GRENADES, AND TWO SMOKE GRENADES.

EQUIPMENT BUNDLE (A-4)

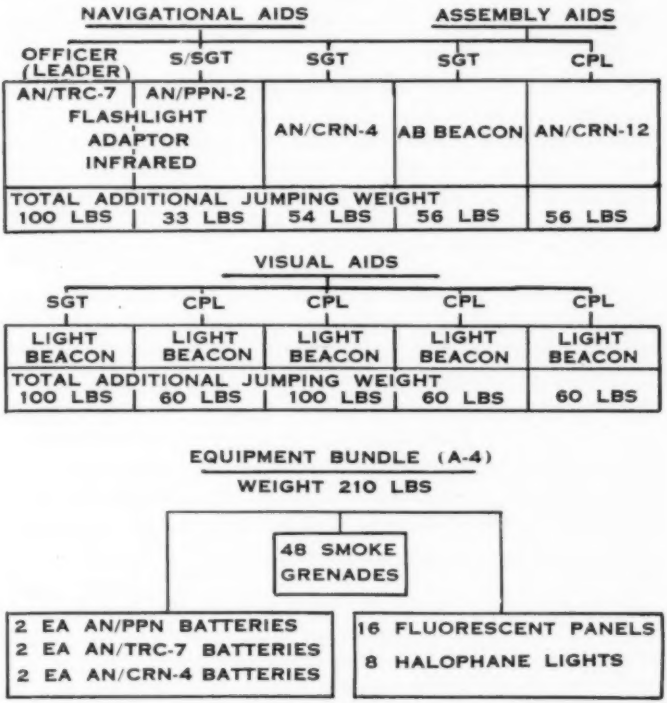
WEIGHT 260 LBS

48 SMOKE GRENADES

2 EA AN/PPN BATTERIES	16 FLUORESCENT PANELS
2 EA AN/TRC-7 BATTERIES	14 HALOPHANE LIGHTS
2 EA AN/CRN-4 BATTERIES	500 RDS .30 CAL AM

CHART 1

PATHFINDER TEAM EQUIPMENT FOR NIGHT OPERATION



EQUIPMENT BUNDLE (A-4)

WEIGHT 210 LBS

ALL PERSONNEL EQUIPPED WITH LENSATIC COMPASS, WRIST WATCH, AND METASCOPE: OFFICER AND S/SGT WITH 10-POWER BINOCULARS. ALL PERSONNEL ARMED WITH SUBMACHINE GUN, .45 CALIBER PISTOL, 184 ROUNDS .45 CALIBER AMMUNITION, TWO HAND GRENADES, AND TWO SMOKE GRENADES.

CHART 2

recoilless rifle crew attached to jump with the team for antitank defense. The organization and equipment of a Pathfinder Team for a day and a night operation are shown by charts 1 and 2.

EQUIPMENT

The Pathfinder Team is equipped to perform reconnaissance, liaison, and communication missions and to engage in close combat for short periods. The equipment of the individual team members and the duties performed by each individual will depend upon the type of operation.

Due to the time factor involved, each team member jumps his entire set of equipment. Attached to his body are especially designed bags equipped with quick release fasteners to facilitate carrying and unpacking during the jump and after the landing. When the team is to reconnoiter proposed landing strips in order to report the feasibility of their utilization directly to the air corps, long-range radio equipment must be added. A more detailed discussion of pathfinder equipment will be given later on in the article.

CHARACTERISTICS

The speed with which a Pathfinder Team may reach an assigned objective is dependent upon the type of bomber or cargo aircraft utilized for transportation. The training of the individual members of the team is such that one team member is capable of setting up and operating all necessary equipment in the event the remainder of the team members become casualties after reaching the area of operations. All members of Pathfinder Teams volunteer for such duty.

LIMITATIONS

The operations of Pathfinder Teams have certain limitations. Batteries for radar, radio, and visual aids must be supplied at regular intervals. Ammunition supply is critical during the initial landing and must be replenished if the team meets organized resistance immediately upon landing. This resupply is usually obtained from the parent organization after the arrival of the main body.

Unless operations are planned with the greatest care toward secrecy, the teams may drop into an ambush resulting in annihilation.

Concealment is extremely difficult during the establishment of the initial communications facilities due to the terrain ordinarily chosen for drop and landing zones, i.e. flat or slightly rolling fields free from trees, buildings, and other obstacles.

Cargo type aircraft are vulnerable to enemy fighters and ground fire.

EMPLOYMENT

The Airborne Pathfinder Team is the ground "eye" of the airborne unit commander and the "road guide" for the pilots of troop carrier aircraft during the initial landing and subsequent resupply phases of an airborne operation. The teams should precede the division by fifteen minutes to one hour depending upon how accurately the Air Corps Pathfinder pilots can locate the drop zone. The assembly aids to be used by the first unit of battalion strength to land on the DZ are set up by the Pathfinders. This facilitates rapid assembly and allows the unit quickly to take up defensive positions around the landing area for protection to the elements of airborne troops that follow.

Under exceptional circumstances, such as the German offensive in the Ardennes during World War II, Pathfinder Teams of the airborne division may be dropped to units other than airborne to facilitate resupply by air and to select, survey, and report emergency air strips for airlanding troops and supplies. Pathfinder teams should not be used for routine reconnaissance and patrolling when less specialized troops may be used. The use of highly trained communications and reconnaissance personnel for routine patrols is not warranted due to losses sustained in such actions. Pathfinders should revert to the control of the division G-4 to assist with resupply by air and the reception of airlanded or glider troops after the initial mission is completed.

The following information and instruction should be given to the Pathfinder team prior to departure on a mission:

(1) All available information on enemy and friendly troops.

(2) Pertinent parts of the unit operation order covering the operation.

(3) A definite statement of the mission to be performed to include SOI for all aids to navigation and number, type, time of arrival, and direction of approach of all aircraft.

(4) When, where, and by what means initial reconnaissance reports are to be rendered.

(5) Any secondary mission after completion of primary mission.

When assigning missions to Pathfinder troops the following principles should be observed:

(1) The Pathfinder Team of one officer and nine men is the basic tactical unit.

(2) Where heavy opposition is expected, two or three teams, each transported in a separate aircraft with attached security, should be dispatched to each drop or landing zone. These teams should be designated as primary, first alternate, and second alternate in regard to performance of the mission. In the event one or more aircraft are lost enroute due to enemy action, the alternate team performs the mission with the remaining team furnishing additional security.

During training, Pathfinder Teams may be attached to the air corps unit that will transport them to the battle area in specially equipped pathfinder aircraft. Such an arrangement allows participation in joint training and injects a personal note in that Air Corps Pathfinder Crews and Airborne Pathfinder Teams become acquainted, thereby inspiring mutual trust and confidence in the capabilities of each other. This is of particular importance when the Pathfinder Team is selecting, surveying, and establishing landing strips in forward areas.

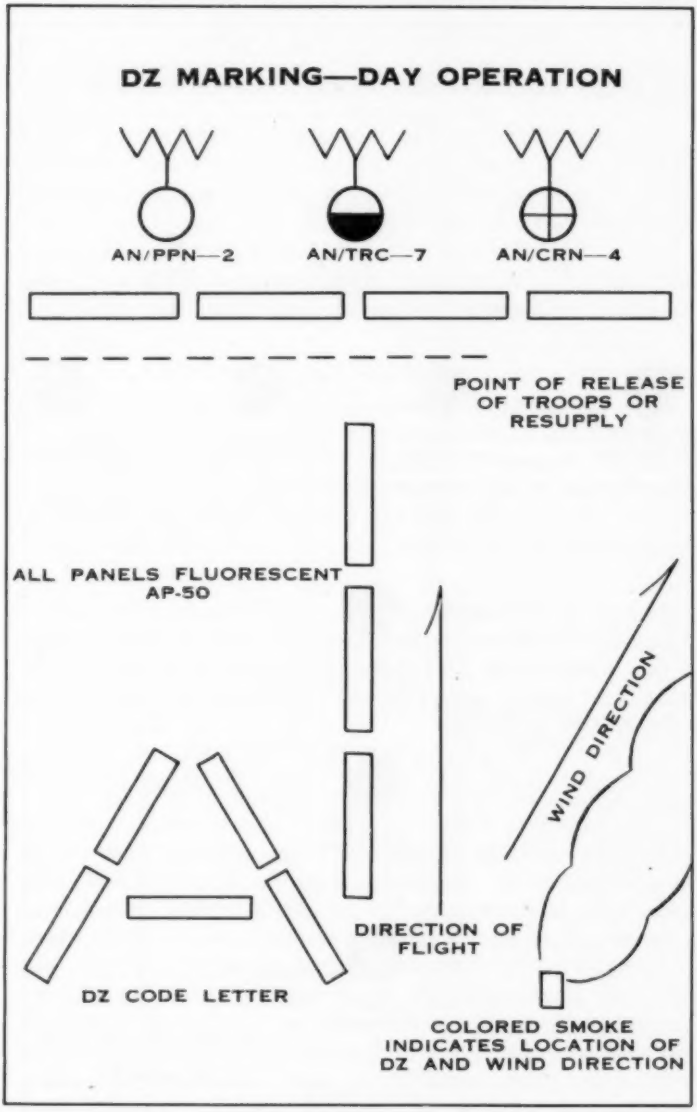


FIGURE 36.—Diagram of panels and equipment set up on drop zone for daylight operation.

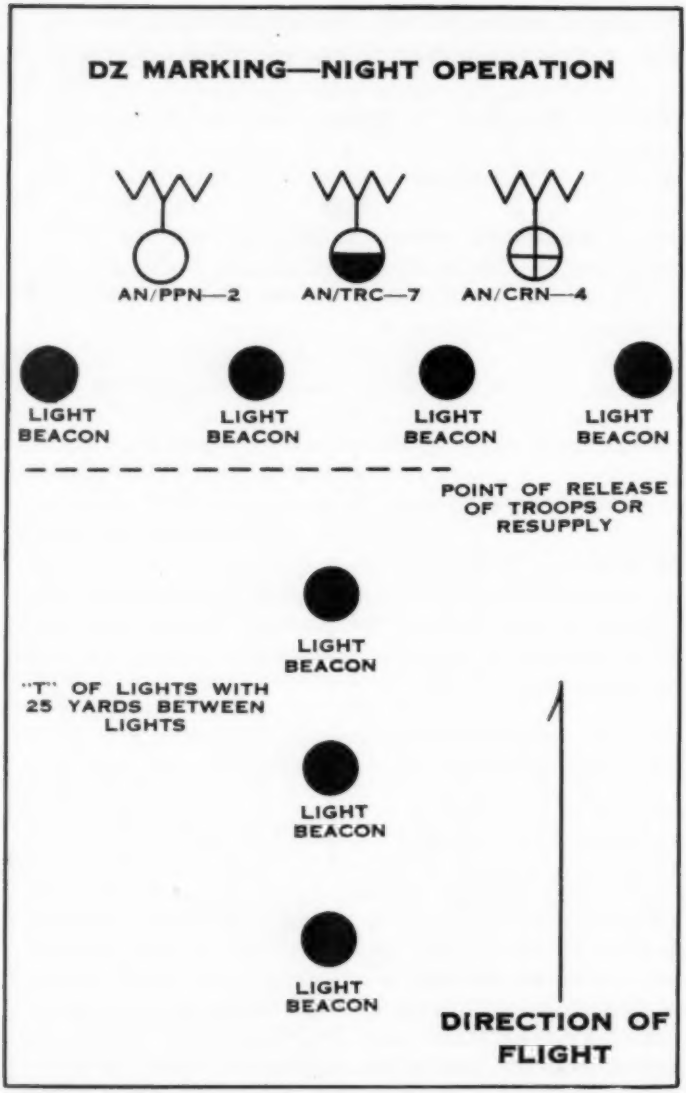


FIGURE 37.—Diagram showing beacon lights and equipment on DZ for night operation.

COMMUNICATIONS EQUIPMENT

When marking drop zones for airborne troops or for the delivery of resupply, it is essential that the Pathfinder Team on the ground establish two way communication with the pilot of the lead aircraft, when the planes are at a minimum of twenty miles from the drop zone or landing zone. This is necessary, so that the air corps element will have the maximum amount of air space in which to maneuver in case a change in the direction of flight of the formation is required to insure accurate delivery of troops or supplies.

When making a ground reconnaissance during the process of surveying and reporting locations of proposed air strips, two way communication with the air corps headquarters dispatching aircraft to the new strip is necessary. In some cases, it may be necessary to use an aircraft in the air over or near the proposed strip as a relay station, due to the limited power of the radio sets now available for use by Pathfinder Teams.

The communications equipment presently in use by Pathfinders, with a brief description of the employment, is set down in the following paragraphs. (For positions of equipment on DZ see Figures 36 and 37.)

AIDS TO AIR NAVIGATION

The AN/TRC-7 is an amplitude modulated voice radio transmitter and receiver operating over a frequency range of 100 to 156 megacycles. (See fig 38) This set has an air-ground range in excess of twenty miles. It is jumped and operated by the team leader. It provides two way voice communication between the Pathfinder Team leader and the pilot of the lead aircraft of the troop carrier formation. This allows the Pathfinder Team leader to direct the pilot on a proper heading, and give the command to drop the troops or resupply when the aircraft formation is over the desired delivery area. The AN/TRC-7 weighs 100 pounds when packed for jumping and is fastened to the jumper's harness with quick release fasteners during the exit. As

FIGURE 38.—AN/TRC-7 set up on ground.

soon as the jumper's main parachute is open, the AN/TRC-7 bundle is unsnapped and allowed to come to the ground supported by a reserve parachute. The bundle remains attached to the jumper by a 125-foot line to facilitate rapid recovery and installation upon landing. (See fig 39.) The AN/TRC-7 is powered by one BA-70 or one BA-80 dry battery. Two spare batteries are carried in the bundle.

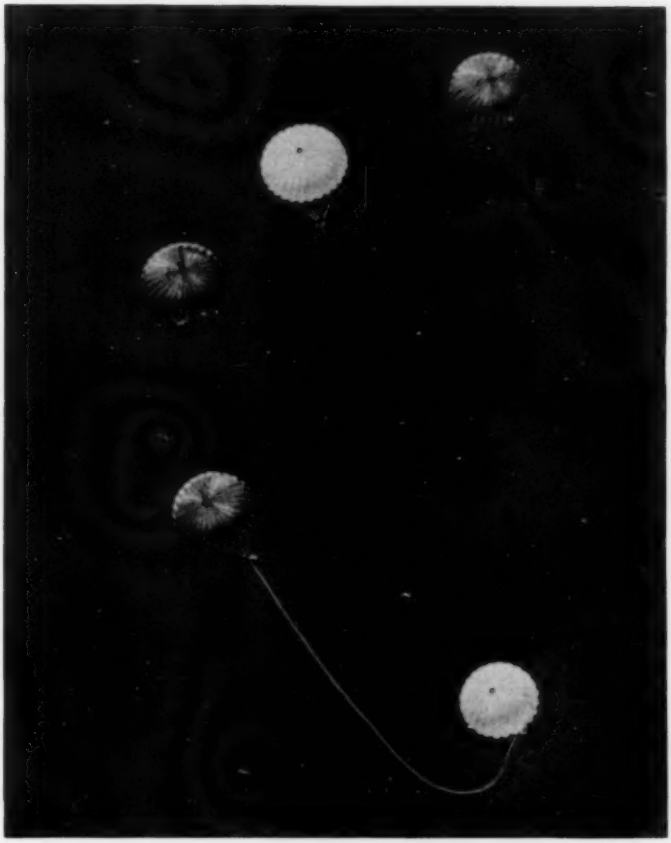


FIGURE 39.—Descending team leader with AN/TRC-7 attached.

The AN/PPN-2 is a radar beacon of the interrogator-responder type, commonly known as the Eureka of the famous British Rebecca-Eureka navigation system. (See figure 40.) When the AN/PPN-2 is set up on the drop zone it receives a signal transmitted from the approaching aircraft and retransmits the signal to the aircraft on a different frequency. This signal appears in the form of a "blip" of

green light on a cathode ray tube in the navigator's compartment of the interrogating aircraft. As long as the aircraft is on course, this "blip" of green light will appear on the center of a line calibrated in miles that is superimposed on the navigator's cathode ray tube receiver. If the aircraft wanders off course, the "blip" moves correspondingly from the center line. The distance from the aircraft to the drop zone is read directly from the calibrated scale. The green light or drop signal is given when the "blip" centers the line at zero miles. The AN/PPN-2 weighs thirty-three pounds when packed for jumping. It is fastened to the jumper's harness with two quick release devices just under the reserve parachute and is so transported to the

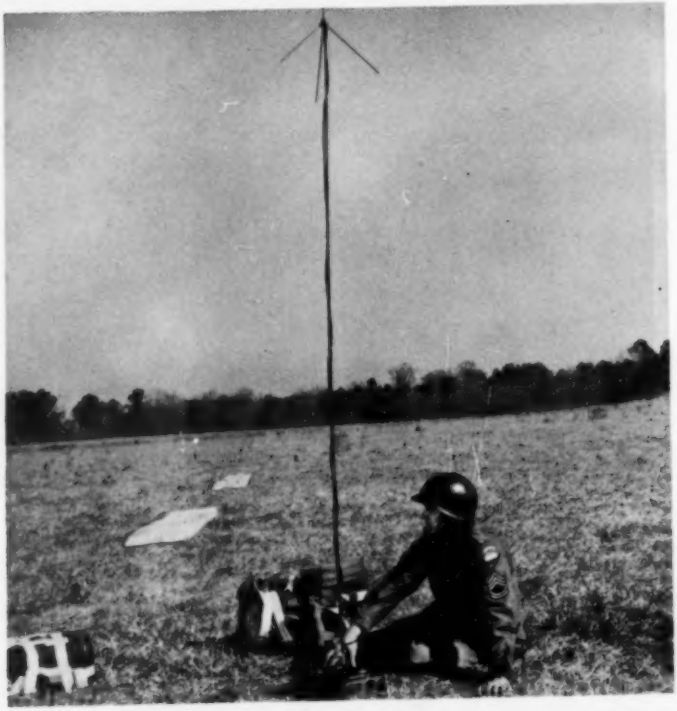


FIGURE 40.—Pathfinder homing in aircraft with the AN/PPN-2, transmitter receiver beacon.

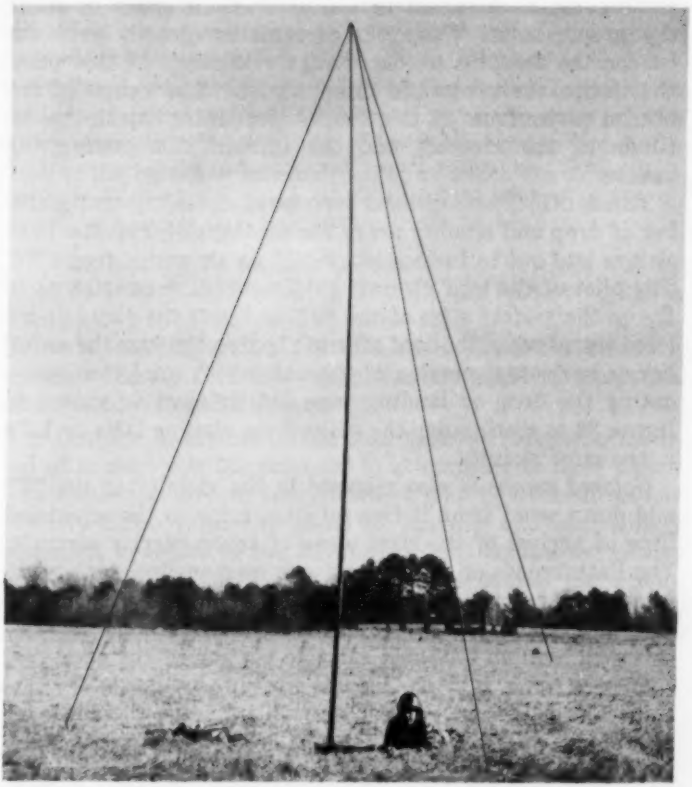


FIGURE 41.—Pathfinder and AN/CRN-4 low frequency radio compass beacon.

The *AN/CRN-4* or radio compass beacon, is a one tube radio transmitter operating over a frequency range of 1450-1700 kilocycles. (See figure 41.) The theory of operation of the AN/CRN-4 may be compared to that of the lensatic compass. When the beacon is installed with its 25-foot vertical antenna, the emitted wave affects the needle of a compass mounted in the aircraft in the same way that magnetic north affects the needle of the lensatic compass. The pilot has only to fly the bearing indicated by the

radio compass mounted in the aircraft in order to reach the proper area. When the aircraft is directly over the beacon the compass needle swings violently. At this point the troops are given the jump signal. The range of the beacon varies from 20 to 45 miles depending upon the altitude of the aircraft and the terrain surrounding the beacon.

Panels AP-50 are utilized for visual signalling and marking of drop and landing areas for daylight operations. Panels are laid out to form a letter "T" as shown in figure 36. The pilot of the lead aircraft so directs his formation as to fly up the verical stem of the "T" and give the jump or release signal when the lead aircraft is directly over the crossbar or horizontal portion of the panel "T". A letter designating the drop or landing zone is displayed as shown in figure 36 to distinguish the point from similar DZ's or LZ's in the same vicinity.

Colored smoke is also released in the vicinity of the "T" and down wind from it five minutes prior to the scheduled time of arrival of the first wave of troop carrier aircraft. The Pathfinders on the ground are responsible for determining wind drift, and must so place the beacons and visual aids that troops or resupply released directly over the display will land on the most suitable portion of the area.

Special signal lights—The use of ordinary lights by Pathfinders proved to be tactically unsound during the Normandy Campaign. As a result, special signal lights were developed for marking the drop or landing zone in night operations. These lights have also been used successfully for marking runways for night landing of powered aircraft or gliders.

ASSEMBLY AIDS FOR GROUND TROOPS

The assembly aids carried by the Pathfinder Team consist of the *AN/CKN-12* and the *Beacon, Airborne, M1.* (See figure 42.) The AN/CRN-12 is very similar to the radio compass beacon, AN/CRN-4 described in one of the foregoing paragraphs. The AN/CRN-12 serves as a beacon for the Homing Modification Kit, MC-619, and operates in conjunction with the SCR-536 radio. The AN/CRN-12

emits a signal of one minute duration on each of four frequencies, corresponding to the regularly assigned company command frequencies of the three line companies and the battalion headquarters company of the airborne battalion. This equipment utilizes the directional properties of the Loop Antenna (MC-619), in order to determine the direction to the battalion assembly point at which the AN/CRN-12 is located. Each jumpmaster is equipped with an SCR-536 with MC-619 attachment.

Upon landing he unfolds the small loop antenna and by holding it aloft and rotating it until the loudest signal is received, he is then able to shoot an azimuth to his own battalion's assembly point. He is able to check his direction at four minute intervals when the AN/CRN-12 transmits for one minute on his frequency.

Attention is invited to the fact that the foregoing method of assembly is far superior to attempting to have troops assemble on a terrain feature which may be as much as one to two miles from the point of landing and exceedingly difficult to locate in the darkness. This equipment is also very helpful to patrols who may move behind the enemy lines with almost utter disregard to direction of return to their own unit.

Infrared light is utilized for communication during the assembly after landing. Each jumpmaster is equipped with a flashlight, TL-122 with infrared filter. All airborne personnel carry the metascope, Type US/F which makes infrared visible when used for scanning. The jumpmaster is therefore able to assemble his stick of parachutists by holding the flashlight aloft and allowing the men to assemble on him.

As a further aid, the Beacon, Airborne, M1, is set up at the battalion assembly area with the AN/CRN-12 beacon. (See fig 43.) The Beacon A/B, M1 is a large infrared light mounted on a 35-foot mast and coded with the battalion assembly code to distinguish it from other assembly points in the same locality. With the use of the above equipment it is a relatively simple matter for the battalion commander to direct his four companies to assemble on the four cardinal

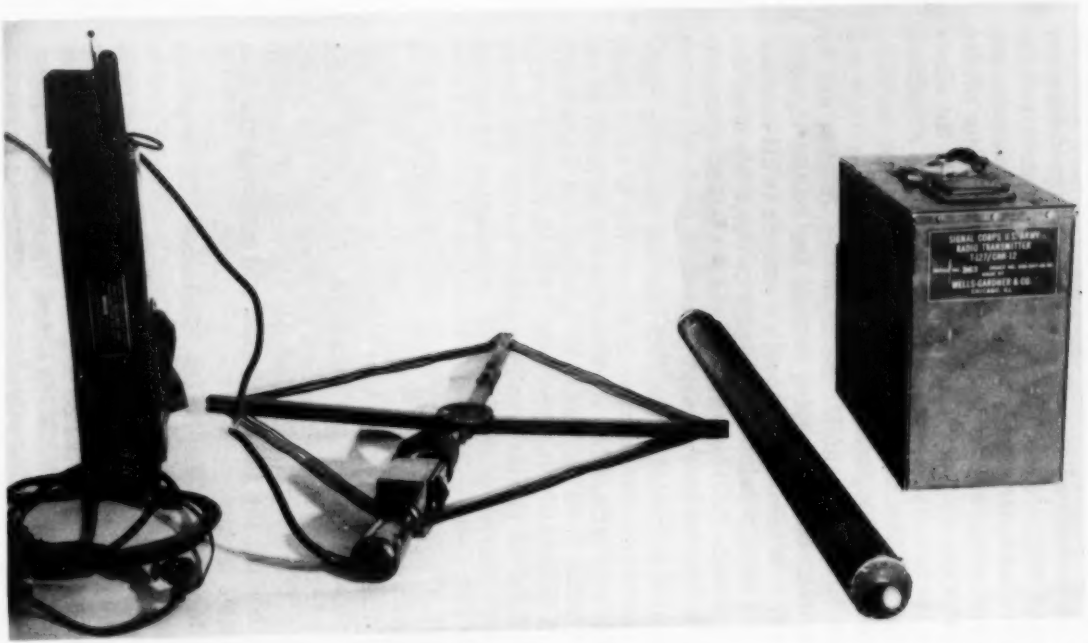

SIGNAL CORPS U.S. ARMY
RADIO TRANSMITTER
WELLS-GARDNER & CO.

FIGURE 43.—Airborne Beacon M1.

points of the compass, one or two hundred yards from the AN/CRN-12 and the Beacon, A/B, M1. The infrared equipment may also be used to mark landing points for assault boats during river crossings, for marking paths through mine fields, and as limiting points for weapons laying down fire on a final protective line during the hours of darkness. The beacon may also be coded with a telegraph key for night signalling.

When Pathfinders are assigned a reconnaissance mission requiring them to make a survey to supplement the information gained from air photos, and report the possibility of using proposed air strips for landing troops and supplies, the AN/GRC-9 with long wire antenna is utilized to report the results of the survey. Distances from a coordinate located in the center of the field to surrounding terrain features and obstacles, are transmitted in message form by use of the clock system commonly used to designate bullet strikes in range firing. A base line passing through the center of the proposed field and a given coordinate corresponds to 12 o'clock. All measurements are transmitted in code to the rear base as soon as the members of the Pathfinder airlanding team finish the survey and sketch of the field. By utilizing a special sketching paper upon which is superimposed a Loboda circle, a sketch of the proposed strip may be prepared by the rear base upon receipt of the coded message. This sketch is then used to brief the pilots who are to transport troops and supplies to the new strip. The same electronic and visual aids to navigation are established on air strips as are used on drop zones.

FORMATIONS AND MOVEMENTS IN COMBAT

The Team (1 officer, 9 men) is the basic tactical unit. All formations used by a Pathfinder Team must provide for all around security and should facilitate control by the team leader. Movements across open terrain in daylight should utilize the diamond formation to provide all around security for equipment (in the center of the diamond) and for personnel. Due to the limited strength of the team, combat is avoided except when essential to the performance of

the mission. The team members must be well versed in the principles of scouting and patrolling for both night and day operations. The team must perform its mission by stealth and by outwitting the enemy rather than by fighting, if at all possible.

If a member of the team is fired upon by the enemy he should, if at all possible, withhold return fire to prevent disclosing the exact position of the team.

When operating at night, particularly during the assembly after landing, utmost coordination must be developed in order to identify members of the team from the enemy who may be occupying the area. If a landing is affected in such close proximity to the enemy that assembly and standard display of visual signals are impossible, each team member must set up, defend, and operate his own load of equipment in order to furnish the maximum possible aid to the approaching aircraft.

In the event the aircraft transporting the team is damaged or forced down short of the objective, it is the responsibility of each team member to destroy his equipment, thereby preventing capture and utilization by the enemy. All members of the team must be well briefed as to evasive action to prevent capture.

SUMMARY

The Pathfinder Team is the ground "eye" for the airborne division commander and the "road guide" for the troop carrier pilot transporting troops and resupply.

The primary mission of the Pathfinder Teams is to precede the airborne division by fifteen minutes to one hour, land by parachute and establish radio, radar, and visual aids to assist the large troop carrier elements to accurately locate the drop and landing zones for the delivery of troops and supplies.

Pathfinders are also capable of performing reconnaissance missions.

Proposed air strips may be rapidly surveyed, reported upon, and set up for the reception of air landed troops and supplies by airborne Pathfinder Teams.

Pathfinder troops are not capable of sustained action in combat due to limited strength and armament. If it is anticipated that a team will encounter organized enemy resistance immediately upon landing, additional security personnel, armed as dictated by intelligence reports, must jump with the team to augment the defense of the navigational aids.

Pathfinder troops should participate in joint training exercises with the pilots who will drop them in combat and must have training with the air corps when preparing for air landing operations where the Pathfinders are required to survey and establish landing strips in forward areas or behind the enemy lines.

CHAPTER 9

Comparative Data on 4.2-Inch and 81-mm Mortars

New Tables of Organization and Equipment recently released by The War Department are designed to increase the firepower of Infantry units without materially decreasing their mobility or combat strength. One of the outstanding changes is the addition of a heavy mortar company armed with eight 4.2-inch chemical mortars to the infantry regiment.

The 4.2-inch mortar is neither a new weapon nor a weapon new to the infantry. Throughout World War II, in all theaters of operations, chemical mortar battalions equipped with this potent high-angle weapon provided close support to the forward infantry elements. When available, chemical battalions were attached to divisions and mortar companies then attached to regiments so that an infantry battalion was frequently supported by a four-gun platoon. Because of its high degree of accuracy and the effectiveness of its fire many infantry commanders recommended that the 4.2-inch mortar become an organic weapon of the infantry regiment, and officers attending the Infantry Conference concurred in this proposal.

The 4.2-inch mortar will not replace the 81-mm mortar which has also proved its worth in combat. Rather, it is intended to supplement the close supporting fires now available to the regimental commander and to provide a weapon capable of reaching the enemy in defiladed positions at ranges up to 4400 yards. (The 81-mm mortar in use during the last war had a maximum range of 3290 yards; however, the latest model of this weapon has a maximum range of 4400 yards.) It is apparent that by proper employment these two weapons can be used to supplement each other on

defiladed targets in the regimental zone thus greatly increasing the volume of fire that can be concentrated in a designated area.

Both weapons are derived from the Stokes Trench Mortars of World War I fame. The trench mortar was of unquestioned value due to its ability to engage targets that were protected from the fire of flat trajectory weapons, its mobility, its fire power, and its simplicity of operation. The most serious limitation of the World War I mortars was their short range. The 3-inch Stokes had a range of 750 yards; the 4-inch could reach out to only 1000 yards. However, it was realized that if a shell could be developed which was stable in flight, these ranges could be greatly increased.

Two means of insuring stability of mortar rounds in flight were developed; the first was the use of fins such as those that now guide an 81-mm mortar round in flight. However, the use of fins necessitated changing the shape of the round to the tear-drop shape of the present 81-mm mortar round in order that the fins need not be larger than the diameter of the shell; this redesign resulted in a material decrease in the filler capacity of the round. Since the reduction of the filler capacity of the chemical round was obviously undesirable, a means of stabilizing the round in flight was developed which permitted the cylindrical shaped shell to be retained. A round was developed which could slide freely down the mortar tube, and then, when the propelling charge was ignited, the impact of the explosion would force a rotating disc to expand and grip the lands and grooves thereby imparting a twist to the round as it travelled the length of the tube giving it rotation in flight. This rotation imparts a gyroscopic action which stabalizes the round and also insures nose impact. This method is used to guide the present 4.2-inch mortar round in flight.

The tactical employment of the *heavy mortar company* is being studied by The Infantry School. A full treatment of the tactical employment of this company is not within the scope of this article. However, the characteristics and limitations of the 4.2-inch mortar do suggest conclusions

as to its employment. The weight of the 4.2-inch mortar prohibits movement by hand for long distances or for short distances rapidly. Construction of emplacements for the mortar require time. Ammunition is bulky and heavy. The weapon is accurate and has a maximum range of 4400 yards. From these facts it becomes apparent that for maximum mobility the mortar platoon is dependent on its organic motor transportation. The time involved in preparation of emplacements makes it desirable that positions be selected from which the mortars can give support to the regiment for protracted periods of time. Positions should be selected near main supply routes to facilitate the supply of ammunition and should be as far forward as the terrain will permit to enable a profitable use of the long range of the weapon.

The platoon is the basic fire unit and since there are only two platoons in the heavy mortar company, it appears unlikely that the attachment of mortar platoon to an infantry battalion will be frequent. A fire direction center operated by personnel from the company headquarters will control the fire of the company, thus permitting the platoons to be disposed to effectively cover the entire regimental front. (At a range of 2000 yards a platoon can cover a front 700 to 1200 yards in width.)

The *heavy mortar company* has a definite place in the infantry regiment, and when properly employed, will provide the regimental commander the additional fire power that is needed for that extra punch.

Illustrations on the following pages graphically present a comparison between the 81-mm and 4.2-inch mortars. A study of the more important characteristics will answer many questions in the mind of the infantryman and give a better understanding of the place the weapon will take in Infantry organization.

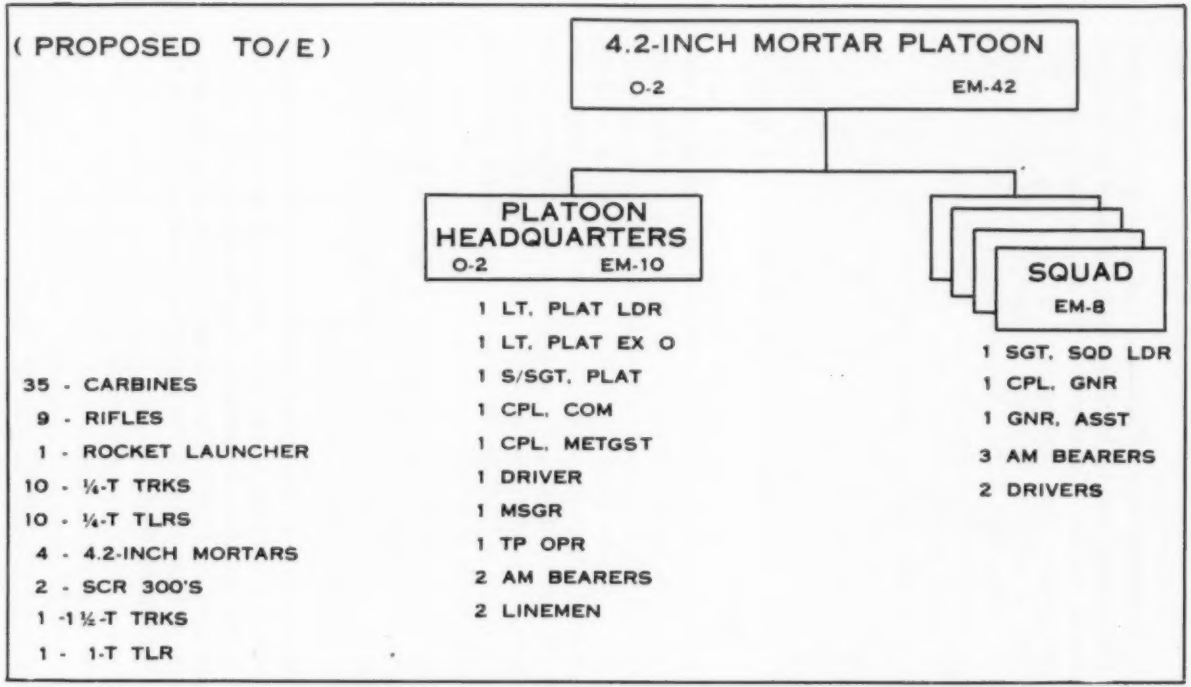


FIGURE 44.—Organization and equipment of the 4.2-inch mortar platoon (two platoons and company headquarters comprise the heavy mortar company).

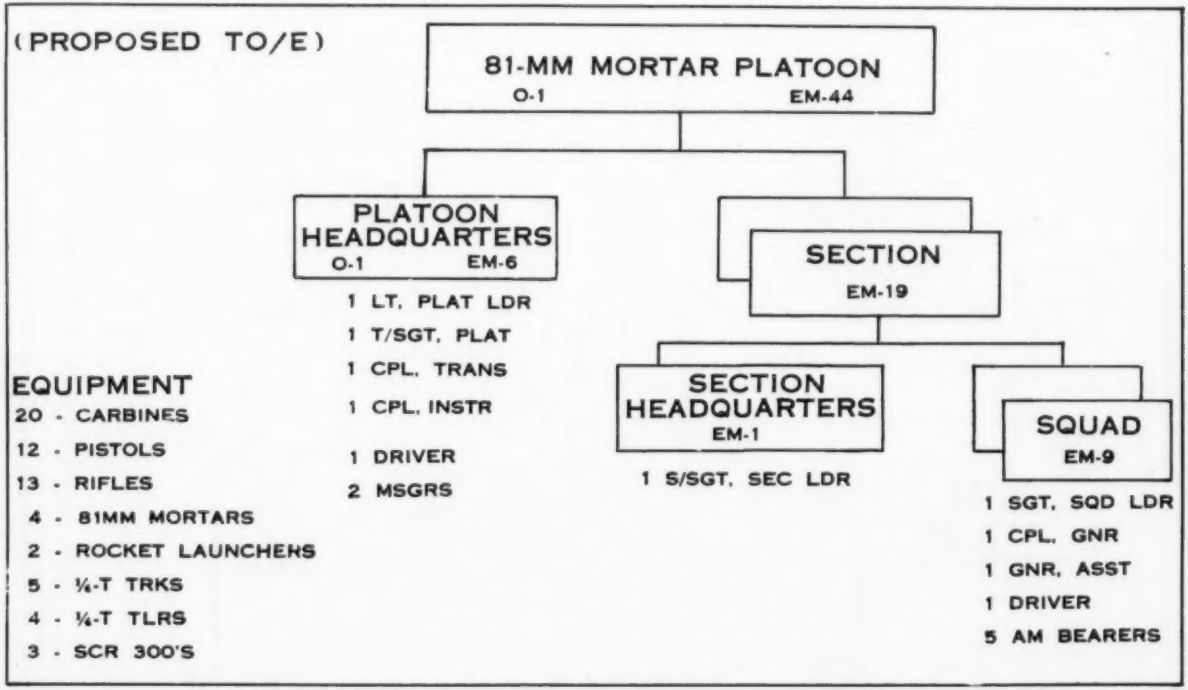
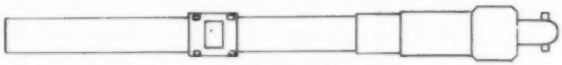


FIGURE 45.—Organization and equipment for the revised 81-mm mortar platoon. (One platoon to each heavy weapons company).

4.2-INCH CHEMICAL MORTAR

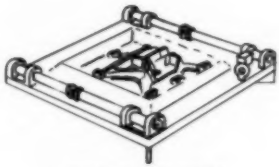


BARREL M2

WEIGHT 105 POUNDS, LENGTH 48 INCHES

STANDARD M1

WEIGHT 53 POUNDS



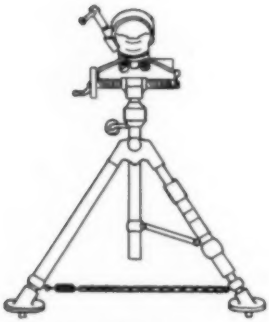
BASEPLATE M2A1

WEIGHT 175 POUNDS

TOTAL WEIGHT OF MORTAR COMPLETE, 333 POUNDS.

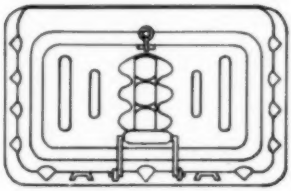
81-MM MORTAR M1

WEIGHT 44.5 POUNDS, LENGTH 49.5 INCHES



BIPOD M5

WEIGHT 46.5 POUNDS

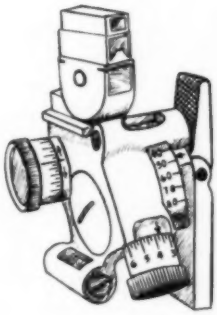


BASEPLATE M2

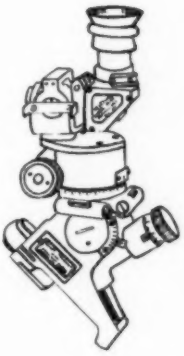
WEIGHT 45 POUNDS

TOTAL WEIGHT MORTAR COMPLETE, 136 POUNDS

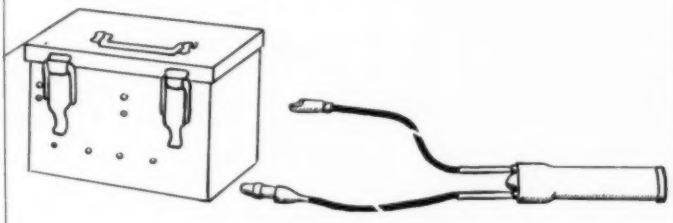
FIGURE 46.—Comparative weights of the component parts of both the 4.2-inch and 81-mm mortars.



81-MM MORTAR SIGHT M-4 GRADUATED IN DEGREES FOR ELEVATION MILS FOR DEFLECTION. ADJUSTABLE 150 MILS RIGHT AND LEFT OF ZERO.



4.2-INCH MORTAR SIGHT M59 WITH ELBOW TELESCOPE M-62. ELEVATION AND DEFLECTION IN MILS. ADJUSTABLE 3200 MILS RIGHT AND LEFT OF ZERO.



M59 SIGHT CASE AND NIGHT FIRING DEVICE

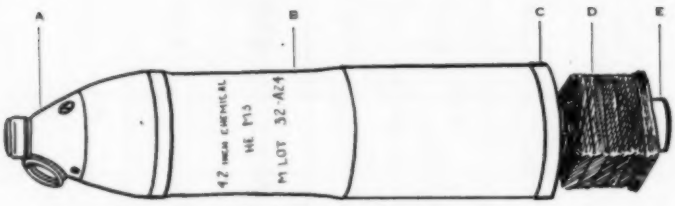
FIGURE 47.—Present sights of the 4.2-inch and 81-mm mortars. 81-mm mortar sight is mounted on the yoke of the bipod and does not have to be removed during firing. 4.2-inch sight is mounted directly on top of the barrel and must be removed during firing. (Carrying case for M4 sight not shown.) The night firing device is used with either sight.

Type & Kind	Weight Pounds	Filler	Fuze Model	Fuze Action	Color and Shell Marking	Range M2
1. Shell, Smoke WP 4.2-inch Mortar, M2	25.50	WP 7.5 lbs	M2	SQ	Grey Yellow Marking	4,258
2. Shell, Smoke, FS 4.2-inch Mortar, M2	25.50	FS 7.5 lbs	M2	SQ	Grey Yellow Marking	4,258
3. Shell, Gas, CG 4.2-inch Mortar, M2	24.25	CG 6.25 lbs	M2	SQ	Grey Red Marking	4,397
4. Shell, Gas, HD 4.2-inch Mortar, M2	24.20	HD 5.8 lbs	M2	SQ	Grey Green Marking	4,397
5. Shell, Gas CNB 4.2-inch Mortar, M2	23.50	CNB 5.45 lbs	M2	SQ	Grey Orange Marking	4,397
6. Shell, Gas CNS 4.2-inch Mortar M2	25.00	CNS 7.0 lbs	M2	SQ	Grey Orange Marking	4,258
7. Shell, HE 4.2-inch Mortar M3	24.50	TNT 8.5 lbs	M3	SQ	OD Yellow Marking	4,397
8. Shell, HE 4.2-inch Mortar M3	24.50	TNT 8.5 lbs	M4	Delay	OD Yellow Marking	4,397
9. Shell, HE 4.2-inch Mortar M3	25.50	TNT 8.5 lbs	M5	Time	OD Yellow Marking	4,397
10. Shell, Subcaliber 3-inch, M5, for 4.2-inch Mortar	6.00	None	M1	Impact FS Nose	Black White Marking	425

FIGURE 48.—Ammunition data for the 4.2-inch mortar.

	Type and Kind	Weight Pounds	Filler	Fuze Model	Fuze Action	Color and Shell Marking	Range in Yards M1	Range in Yards M21 w/Extension
1	Shell, HE Light 81-mm Mortar M43	6.92	TNT 1.22 lbs	M52	SQ	OD Yellow Marking	3,200	4,400
2	Shell, HE Heavy 81-mm Mortar M56	10.77 / 11.25	AMATOL 4.30 lbs	M53 / M77	Delay / Time	OD Yellow Marking	2,600	3,550
3	Shell, Smoke, WP 81-mm Mortar M57	11.57 / 12.05	WP 4.06 lbs	M52 / M77	SQ / Time	Grey Yellow Marking	2,400	3,050
4	Shell, Illuminating, 81-mm Mortar T18	11	Parachute FLARE	M84	Time	Grey Black Marking	2,500	3,300
5	Shell, Practice, 81-mm Mortar M44	6.92	INERT	M52	SQ	Blue White Marking	3,200	4,400
6	Shell, Training 81-mm Mortar M68	10	SOLID	None	None	Black White Marking	330	——

FIGURE 49.—Ammunition data for the 81-mm mortar.

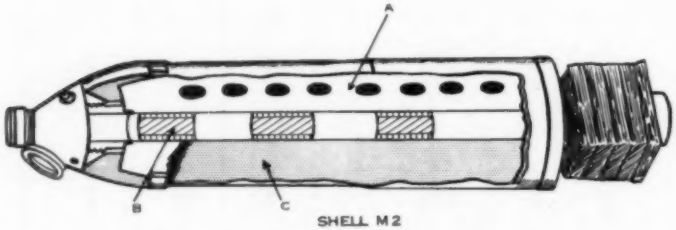


4.2 INCH CHEMICAL MORTAR SHELL, HE, M3

WEIGHT 24.5 POUNDS. TNT FILLER 8.5 POUNDS. LENGTH 24 INCHES

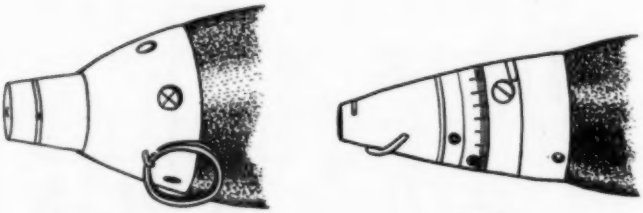
A–FUSE B–SHELL BODY C–ROTATING DISK

D–POWDER RINGS E–IGNITION CARTRIDGE



SHELL M2

A–VANE B–BURSTER C–FILLING



FUSE M3 (M2) (IMPACT)

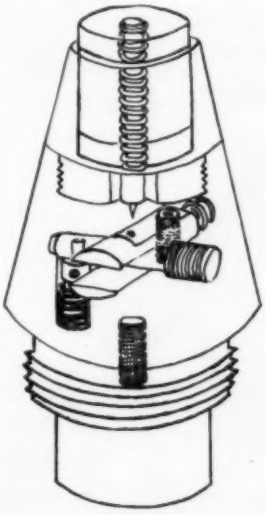
FUSE M5 (TIME AND SUPERQUICK)

FIGURE 50.—Main parts of the two 4.2-inch mortar shells. M2 for liquid filler; M3 for solid filler. The M4 fuze, not shown, has a .15 second delay action. Note vane inside the M2 shell body that forces liquid to rotate with the shell

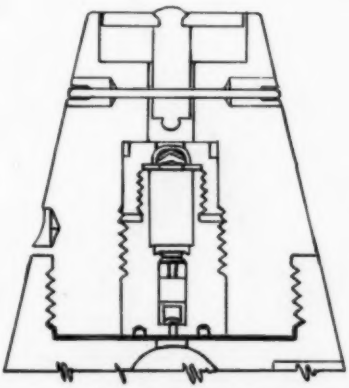
SHELL M43 81-MM MORTAR
(HE LIGHT)

SHELL M56 81MM MORTAR
(HE HEAVY)

A—FUSE B—SHELL BODY
C—FIN ASSEMBLY AND POWDER INCREMENTS



FUSE M52
(BORE SAFE,
SUPERQUICK)



FUSE M53
(BORE SAFE, DELAY)

FIGURE 51.—Main types of 81-mm mortar shells. Heavy shell is also used for WP smoke and for illuminating round. Time fuze M77, not shown, is similar to the one used for the 4.2-inch mortar.

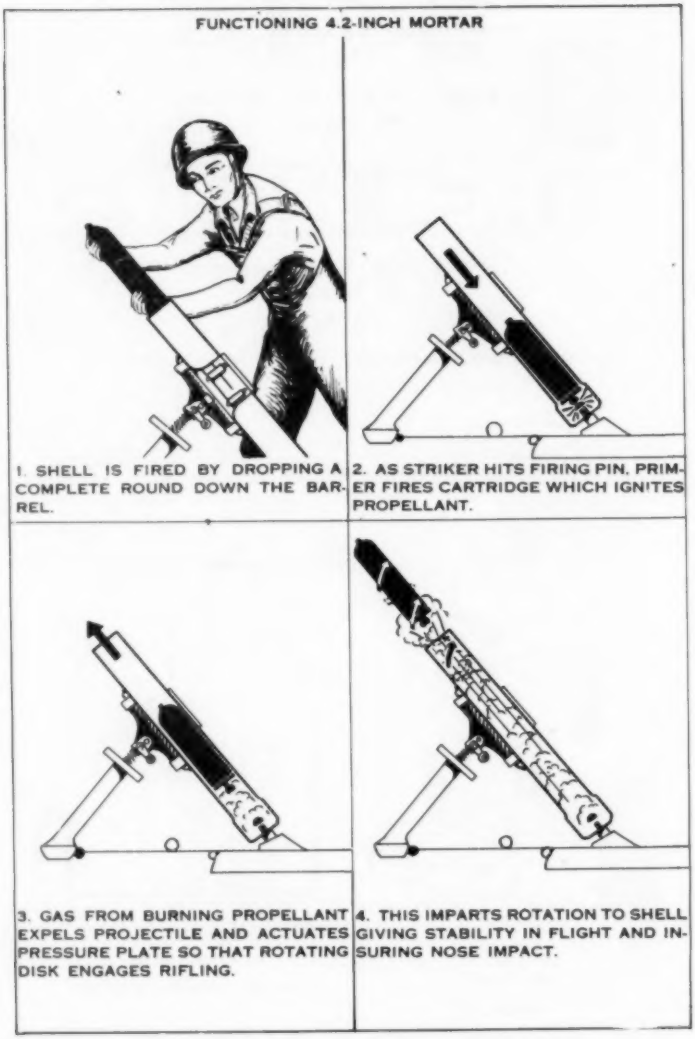

FUNCTIONING 4.2-INCH MORTAR
1. SHELL IS FIRED BY DROPPING A COMPLETE ROUND DOWN THE BARREL.
2. AS STRIKER HITS FIRING PIN, PRIMER FIRES CARTRIDGE WHICH IGNITES PROPELLANT.
3. GAS FROM BURNING PROPELLANT EXPELS PROJECTILE AND ACTUATES PRESSURE PLATE SO THAT ROTATING DISK ENGAGES RIFLING.
4. THIS IMPARTS ROTATION TO SHELL GIVING STABILITY IN FLIGHT AND INSURING NOSE IMPACT.

FIGURE 52.—Functioning of the 4.2-inch mortar. (Fuzes are not armed until the round is about five feet from the muzzle).

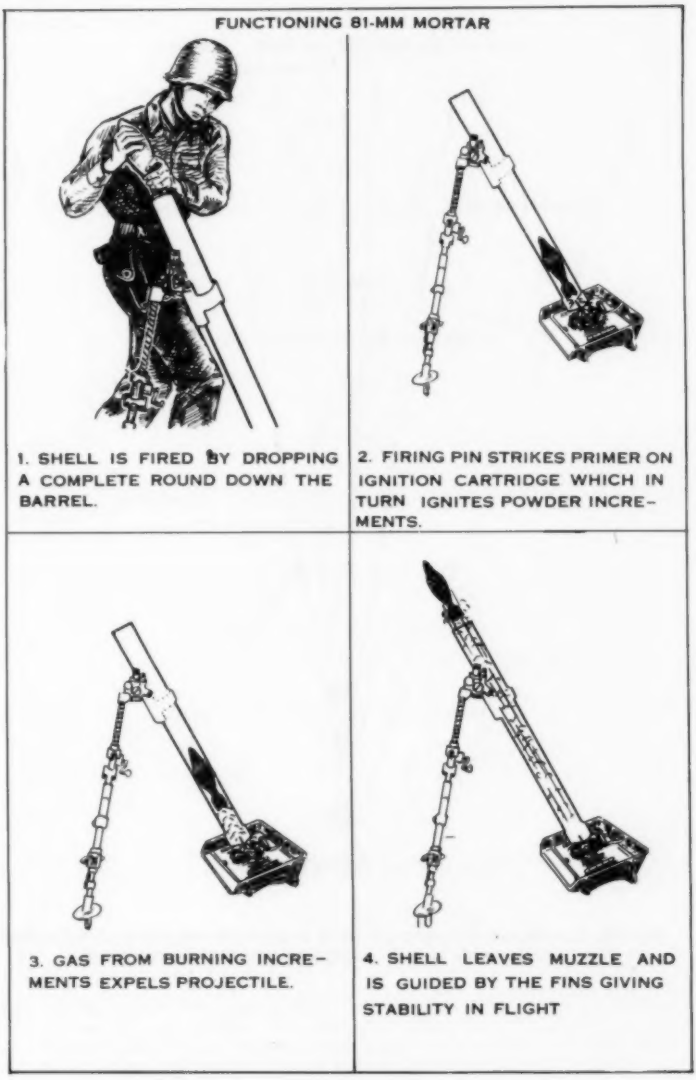

FUNCTIONING 81-MM MORTAR
1. SHELL IS FIRED BY DROPPING A COMPLETE ROUND DOWN THE BARREL.
2. FIRING PIN STRIKES PRIMER ON IGNITION CARTRIDGE WHICH IN TURN IGNITES POWDER INCREMENTS.
3. GAS FROM BURNING INCREMENTS EXPELS PROJECTILE.
4. SHELL LEAVES MUZZLE AND IS GUIDED BY THE FINS GIVING STABILITY IN FLIGHT

FIGURE 53.—Functioning of the 81-mm mortar.

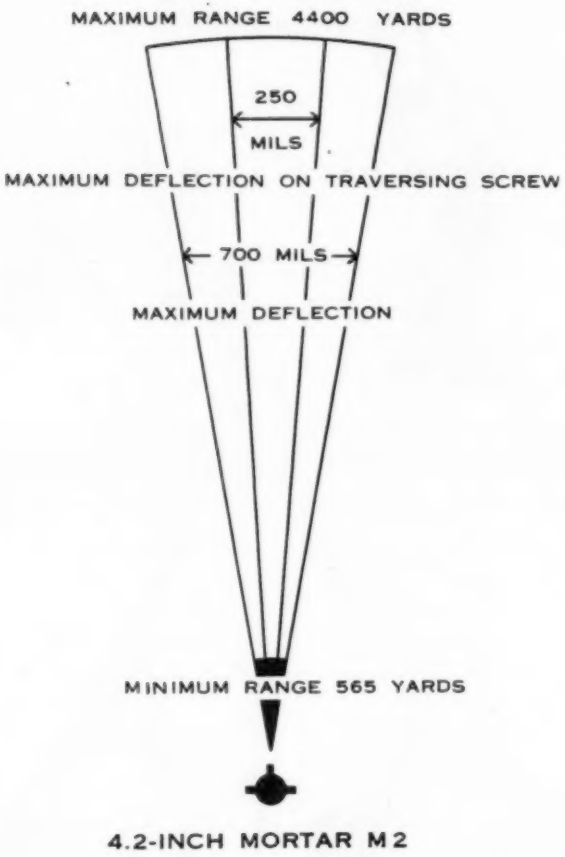


FIGURE 54.—Scale diagram showing maximum ranges and deflection. (Tests to provide a 360° baseplate are now in progress.

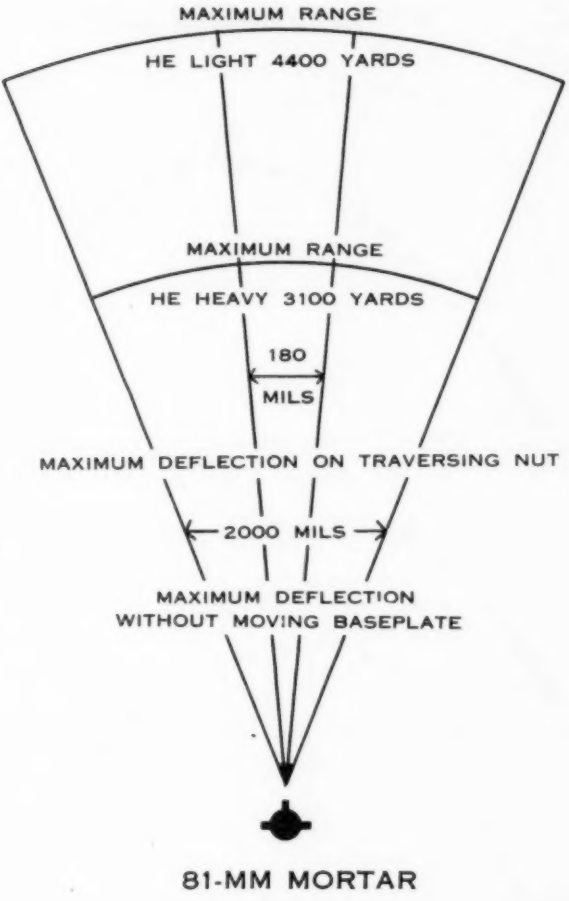


FIGURE 55.—Scale diagram showing maximum ranges and deflection of the 81-mm mortar M1 with T1 extension. The new 81-mm mortar M21 has a circular base plate with a 360° traverse and, with barrel extension, has a maximum range of 4400 yards.

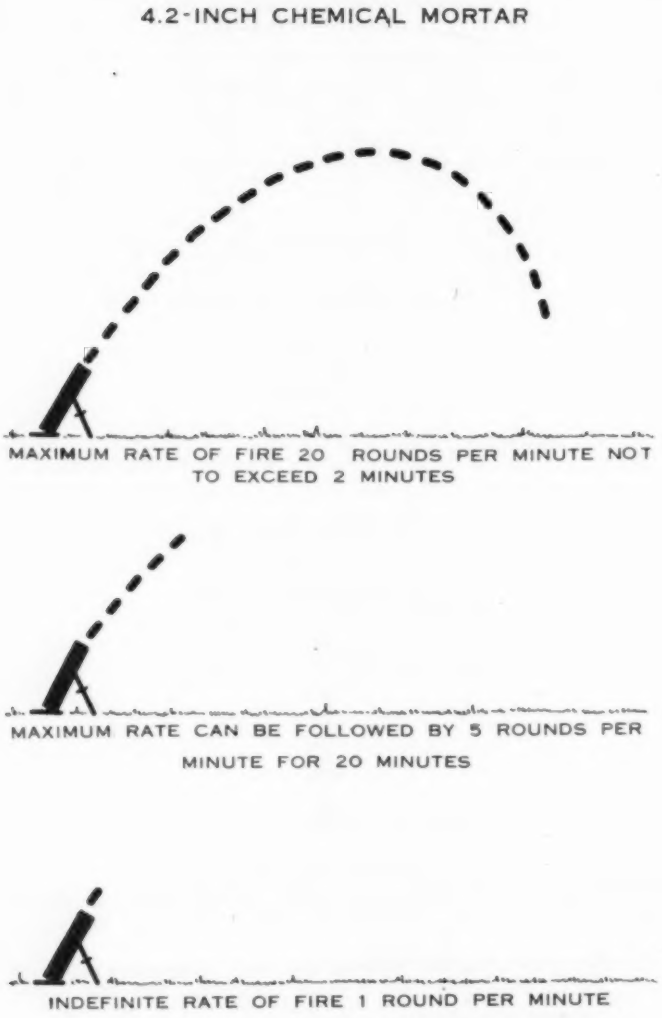

4.2-INCH CHEMICAL MORTAR
MAXIMUM RATE OF FIRE 20 ROUNDS PER MINUTE NOT TO EXCEED 2 MINUTES
MAXIMUM RATE CAN BE FOLLOWED BY 5 ROUNDS PER MINUTE FOR 20 MINUTES
INDEFINITE RATE OF FIRE 1 ROUND PER MINUTE

FIGURE 56.—Rates of fire of the 4.2-inch mortar.

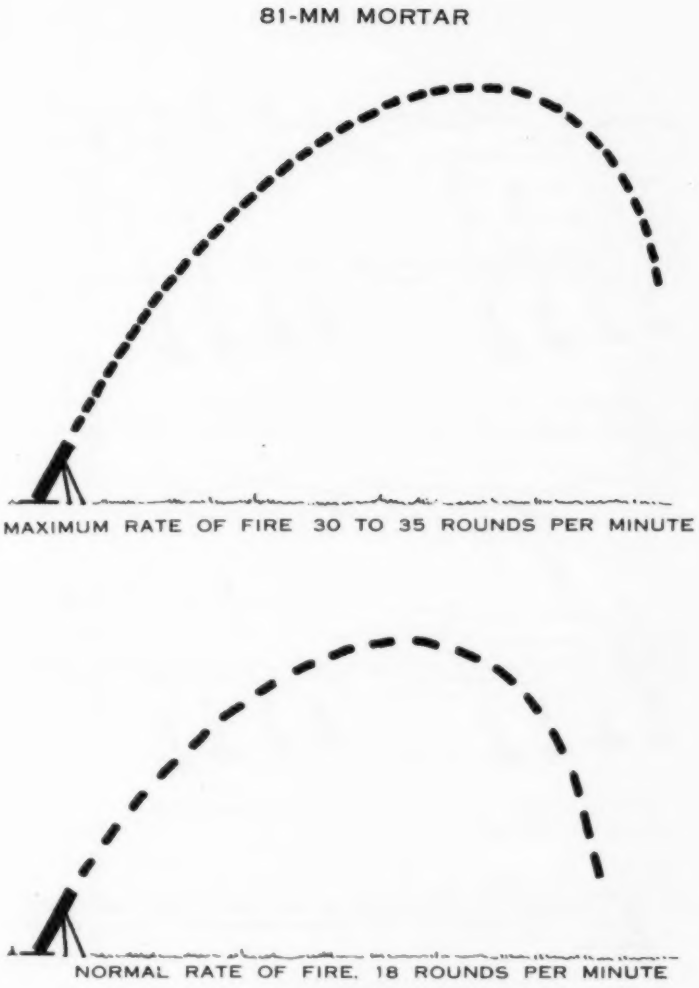


FIGURE 57.—Rates of fire of the 81-mm mortar.

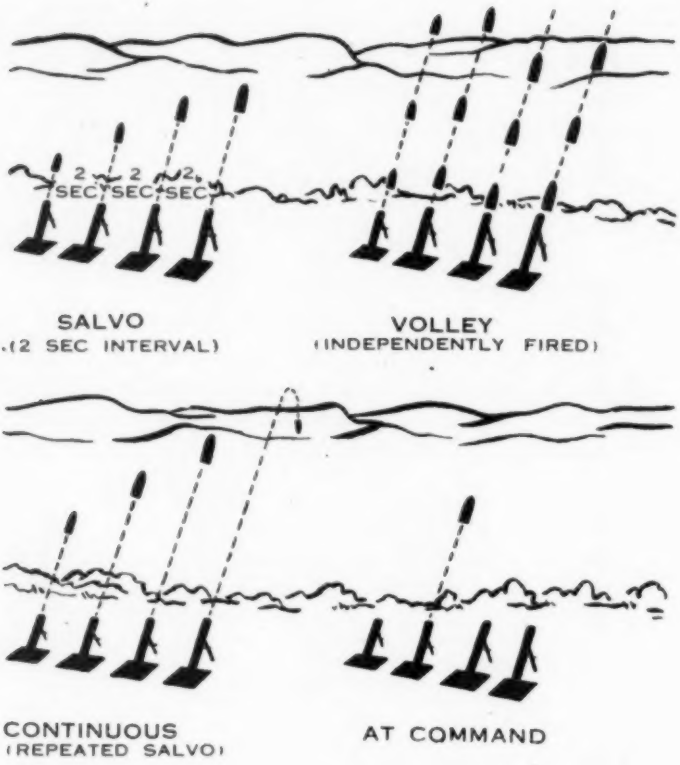


FIGURE 58.—Types of fire common to both the 4.2-inch and 81-mm mortars. This applies to the 81-mm mortar only when fired in battery.

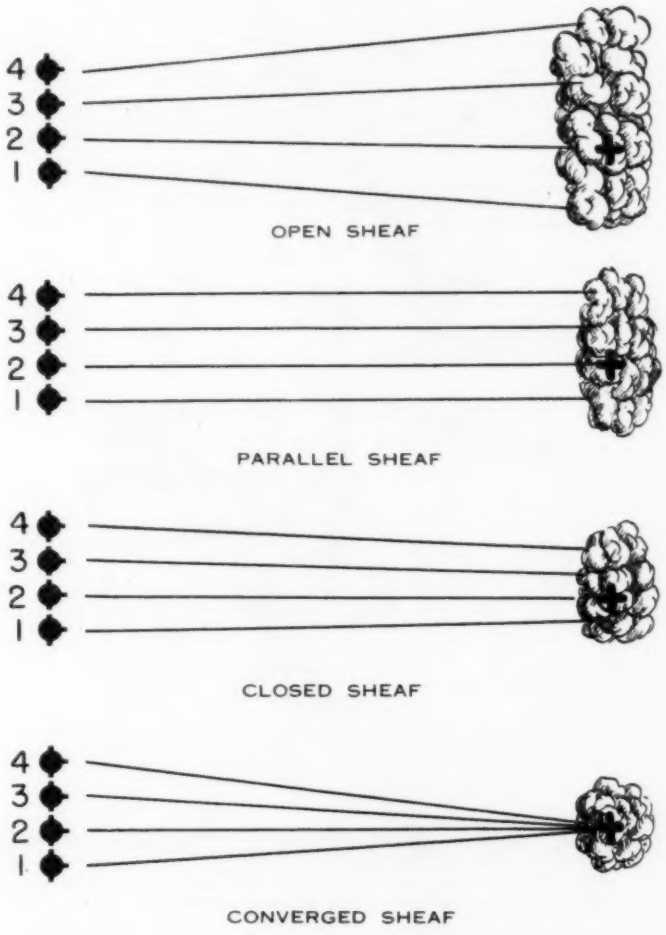
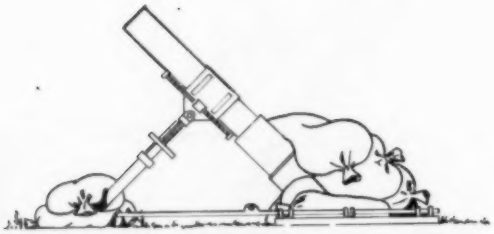
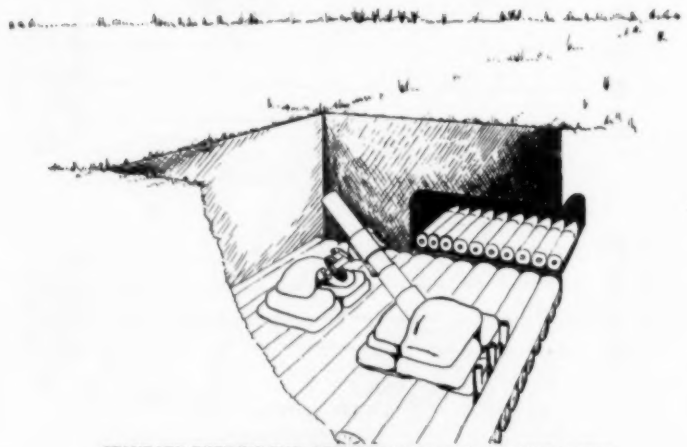


FIGURE 59.—Types of sheaf used by both the 4.2-inch and 81-mm mortars. Control of the width of impact at target area is obtained by closing or opening the battery on the base mortar.



4.2-INCH MORTAR IN HASTY SURFACE EMPLACEMENT. NORMAL EMPLACEMENT WOULD REQUIRE A V-SHAPED PIT TO PERMIT THE BASE OF THE STANDARD TO MOVE TO THE REAR DURING RECOIL.



STANDARD DEEP-PIT EMPLACEMENT WITH PITS PREPARED FOR THE STANDARD AND BASEPLATE. DOUBLE LOG FLOORING WILL SUPPORT MORTAR UNDER ALL WEATHER AND GROUND CONDITIONS.

FIGURE 60.—Two methods of emplacing the 4.2-inch mortar. To obtain accuracy of fire a solid emplacement is required. Time to emplace varies from 10 minutes for normal surface emplacement to several hours for elaborate deep pit emplacement.

81-MM MORTAR MOUNTED FOR FIRING ON GROUND

81-MM MORTAR MOUNTED FOR FIRING IN STANDARD EMPLACEMENT

FIGURE 61.—Two methods of emplacing the 81-mm mortar. Normal emplacement is obtained by mounting mortar on firm ground at surface level.

4.2-INCH MORTAR SQUAD ON ORGANIC TRANSPORTATION

EQUIPMENT LOADED ON CARTS

MORTAR SQUAD MOVING BY HAND CARRY

FIGURE 62.—Transportation of the 4.2-inch mortar. Mobility is reduced when mortar is removed from its organic motor transportation. In very rough terrain pack mules are employed. It can be hand-carried for short distances.

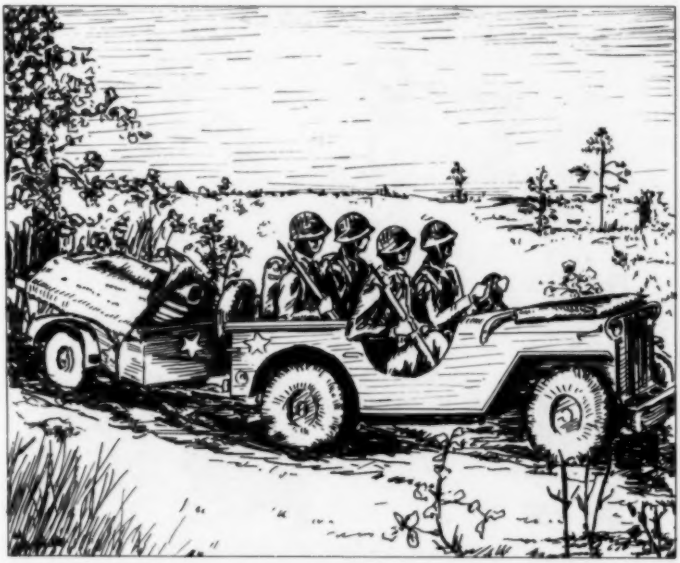


FIGURE 63.—Normal methods of transporting the 81-mm mortar. It can also be hand-carried by two men for short distances.

81-MM MORTAR CREW AT THEIR POSTS

4.2-INCH MORTAR CREW AT THEIR POSTS

FIGURE 64.—Normal posts of the mortar crews. The remainder of the squads are employed in preparing and transporting ammunition.

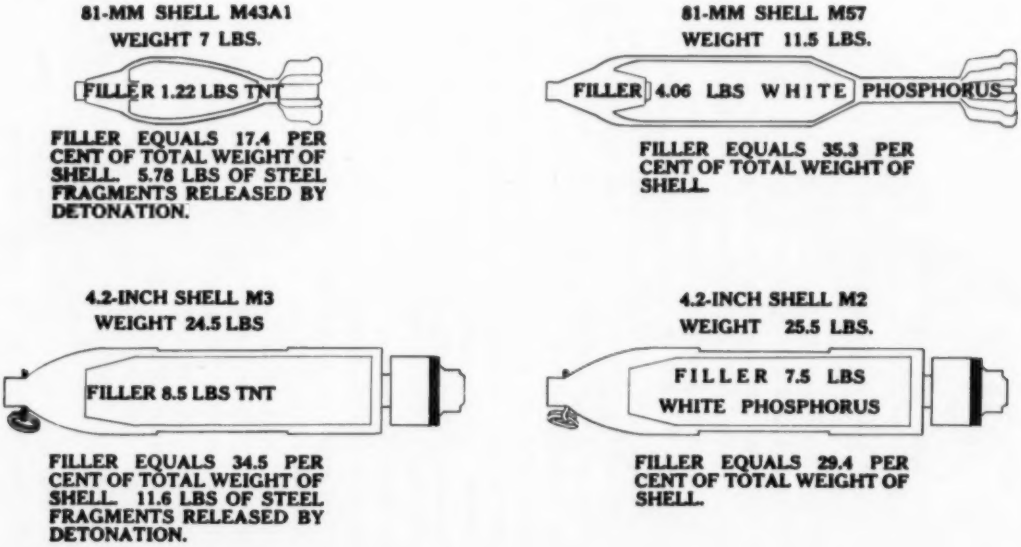

81-MM SHELL M43A1
WEIGHT 7 LBS.
FILLER 1.22 LBS TNT
FILLER EQUALS 17.4 PER CENT OF TOTAL WEIGHT OF SHELL. 5.78 LBS OF STEEL FRAGMENTS RELEASED BY DETONATION.
81-MM SHELL M57
WEIGHT 11.5 LBS.
FILLER 4.06 LBS WHITE PHOSPHORUS
FILLER EQUALS 35.3 PER CENT OF TOTAL WEIGHT OF SHELL.
4.2-INCH SHELL M3
WEIGHT 24.5 LBS
FILLER 8.5 LBS TNT
FILLER EQUALS 34.5 PER CENT OF TOTAL WEIGHT OF SHELL. 11.6 LBS OF STEEL FRAGMENTS RELEASED BY DETONATION.
4.2-INCH SHELL M2
WEIGHT 25.5 LBS.
FILLER 7.5 LBS
WHITE PHOSPHORUS
FILLER EQUALS 29.4 PER CENT OF TOTAL WEIGHT OF SHELL.

FIGURE 65.—Comparison of the filler capacity of the 4.2-inch and 81-mm mortar shells.

CHAPTER 10

The Principles of War

In war, victory can be won only by the ever changing application of the unchanging principles of war. To quote Napoleon, "Read and reread the campaigns of Alexander, Hannibal, Caesar, Gustavus, Turenne, Eugene, and Frederick. Model yourself upon them; this is the only way to become a great captain and to discover the secrets of the art of war". This seventy-eighth maxim of Napoleon is as near as any of the great captains ever came to announcing the principles of war. Although, from the dawn of history to date, the really great commanders have all applied the same basic principles of war, none of them ever listed the principles of war in their writings or taught them to their successors except by example. It was left to soldier-philosophers such as Clausewitz and Jomini to analyze the campaigns of the great captains and to enumerate the immutable principles of war.

Before discussing these principles at length, it may be well to emphasize the difference between a principle of war and a rule of war. The words "principle" and "rule" are often used synonymously in military writing but they actually have different meanings. A principle is a fundamental or general truth, a source, an origin, an ultimate element, or cause; whereas a rule is a prescribed guide for conduct under certain conditions. One usually thinks of a principle as requiring considerable thought for its proper application, whereas a rule is something that is automatically applied when a certain situation occurs. It is probably best that we avoid the term "rule" altogether in discussing war, strategy, or tactics because the infinitely varied circumstances and conditions of combat never produce exactly the same situation twice.

In Training Regulations 10-5, dated 23 December 1921, the War Department announced nine principles of war. They are basic, immutable, and not subject to exception. These principles encompass the whole art of war. Their application to the preparation for war and the direction of war is called strategy, and their application to specific battles and operations is called tactics. These principles are just as applicable to platoons as to armies or army groups. These principles may be learned in a short time but a whole life-time can be spent in the study of their application. This thought was summarized by Col. W. K. Naylor in a lecture given at the Command and General Staff School.

"Some military men figure themselves commanders by the natural born leader route and we so often hear the statement, 'He is a practical soldier, not a theorist,' Too often he is neither, for one cannot be practical without knowing the theory, although that theory may not have been learned in an academy.

"The fundamental principles of war are not numerous, nor are they abstruse, yet the application of them is difficult and is controlled by no rules. Their application to circumstances depends on sound judgement and common sense, which in turn, are developed by study and by practice in applying acquired knowledge to concrete cases. Judgement and sense are of greater importance then mere knowledge."

The principles of war are: the principles of mass, the principle of the objective, the principle of surprise, the principle of security, the principle of cooperation, the principle of the offensive, the principle of movement, the principle of economy of force, the principle of simplicity.

THE PRINCIPLE OF MASS

The term "mass", as here used, means more then mere numbers—it means combat power. Numbers, weapons, tactical skill, fighting ability, resolution, discipline, morale, and leadership all go into making combat power. The principle of mass means the concentration of a superiority of this combat power at the decisive point at the proper time, or having this power in position so that it can be moved to the

proper place at the proper time. A good example of the application of the principle of mass is illustrated by Marshal Von Rundstedt in the now famous Battle of the Bulge. The relentless progress of the allied armies from Normandy to the border of Germany had given the Nazis no respite. The advances made by the allied armies in the north were threatening the vital Ruhr industrial area while in the center and the south, our advances were threatening the equally vital Saar Basin—both areas vital to the continued functioning of the German war machine. Our advances had to be stopped by a counteroffensive. Opportunity for such an offensive came when our attacks in the northern sector were held up by bad weather and our attacks in the south began to slow down. The Germans decided to make their counteroffensive in the Ardennes sector —a sector we were holding very lightly because the unfavorable terrain made a winter offensive unlikely. Without unduly arousing suspicion, Von Rundstedt withdrew several of his crack panzer divisions from the northern sector and replaced them with Volksgrenadier divisions. All in all, Von Rundstedt concentrated twenty freshly equipped and rested divisions on a forty-five mile front. So overwhelming was the German combat power in this sector that despite the unfavorable terrain and fierce allied resistance, the offensive carried sixty miles in five days. It is true that the Allies stopped the counteroffensive and threw it back but the Germans did succeed in gaining time. General Eisenhower said, "I estimated that the enemy attack had delayed our offensive operations by at least six weeks. In addition to this disruption of our effort, the strategic air forces had of necessity been drawn into the battle, thus leaving oil, aircraft, and communications targets deep in Germany free of our attack for nearly a month." By dangerously weakening other fronts and scraping together the last available reserve, Von Rundstedt had properly applied the principle of mass.

THE PRINCIPLE OF THE OBJECTIVE

The second principle of war is the principle of the objective. To understand it we must first understand something

of the nature of war. It was Clausewitz, the soldier-philosopher, who defined war as the ultimate instrument of national policy, the use of force to bend another nation to our will, and force them to adopt policies that do not conflict with our own. When the national policies of two nations come into conflict, the diplomats first try to work out a peaceful solution. If the issues involved are such that a peaceful solution cannot be obtained, war results and each belligerent tries to bend the other to his will by the use of force. Our ultimate purpose in war is obviously to force the enemy to do our bidding.

But what should be the objective of the armed forces in order to acomplish the ultimate purpose? In the past, most military writers and great leaders have maintained that the proper objective of a nation's armed forces in war is the destruction of the enemy's main army. Clausewitz has this say on the subject of objectives: "There are three principle objectives in carrying on war; (a) to conquer and destroy the enemy's armed forces, (b) to get possession of the material elements of aggression, and of the other resources of existance of the hostile army ,(c) to gain public opinion." Elsewhere in his writings Clausewitz says: "The destruction of the enemy's force must be principally effected by means of battles. . . .The military power of the enemy must be destroyed. The country must be conquered, for out of the country, a new military force may be formed. But if even both of these things are done still, the war, that is the hostile feeling and actions of hostile agencies, cannot be considered at an end as long as the will of the enemy is not subdued also." Here Clausewitz seems to contradict himself by bringing forward the idea that the will of the hostile people might be the proper objective for the armed forces in war. However he only apparently contradicts himself because, although realizing that only by breaking the will of the enemy's people to fight could you win a peace, he believed that only by the destruction of the enemy's main armed forces and by the rendering of the enemy incapable of further resistance could the will of the people be broken.

After the war ended in 1918, there evolved a school of thought that challenged the theory that it was necessary to defeat the enemy's army in combat to gain a victory over that army and to force the nation to surrender. It was maintained that in the modern three dimensional war it was possible to gain a victory over a nation or to force the surrender of a nation's army without destroying that army by combat. General Fuller, the British military writer says: "I have gone to this length in the examination of this question because our present theory of war is based on Clausewitz, possibly on a misinterpretation of Clausewitz, who, I consider, misunderstood Napoleon. To the masses of fighting men in war, the object of an army is to destroy an army; of a fleet, to destroy a fleet; and of an air force, to destroy an air force; in fact, to these folk, the object in grand tactics is the maximum destruction at the minimum loss, or more frequently still, at any cost.

"Though in minor tactics this is partially true, in grand tactics, I maintain that it is an error of the first magnitude. The decisive point is not the body of the hostile army, just as politically the decisive point is not the body of the hostile nation. Politically, the decisive point is the will of the hostile nation, and grand tactically, it is the will of the enemy's commander."

Here General Fuller advances the idea that it is possible to strike at the will of the enemy people to continue the war and the will of the commander of the enemy's army to fight without actually destroying his army in combat. The question that naturally comes to mind is: Did the last war bear out General Fuller's ideas on objectives? Did any nation surrender before its Army was defeated in the field? Was it possible to strike at the will of the people to fight without striking at their army? The only clear cut example that supports General Fuller's idea is Czechoslovakia. This country gave in without a fight but only because France and England used her as a pawn in dealing with Hitler. It might be maintained that France and Belgium surrendered before their Armies were completely defeated in the field but it cannot be denied that French and Belgian

Armies would have soon been completely defeated had they continued to resist. In the case of Japan, it at first looks as if we have the perfect example of the breaking of the commander's will, or the breaking of the will of the high command, without destroying the army in the field. It is true that the bulk of the Japanese Army surrendered without having come into contact with the enemy. However, the Japanese Air Force and Navy had been completely defeated; the Armies on the home islands were cut off from the Armies on the mainland of Asia; and the troops on the mainland were cut off from their source of supply on the home islands. The Japanese forces could have continued the fight defensively but all chance for offensive action was lost. It can be said that for all practical purposes the Japanese Army was strategically defeated before the Japanese asked for terms.

Germany and Poland are two examples that definitely disprove General Fuller's theory. Every effort was made to break the will of the people of these countries and to force a surrender before their armies were defeated. The Germans destroyed Polish cities by bombing and subjected the people to planned psychological warfare but not until their army was defeated in the field did the Poles surrender. Everyone is familiar with the efforts made to break the will of the German people and their leaders but not until their Army was completely destroyed did the Germans sue for peace. In the last war, the hostile main army was still the proper objective for our armed forces.

One might well ask the question, "Will the introduction of atomic energy and guided missiles change our conception of the proper objective of our armed forces? Will these new weapons enable us to break the will of our enemies without attacking their armies or armed forces?" Obviously a positive answer cannot now be given to this question. However, it should be remembered that in the last war the systematic destruction of German cities by bombing did not force the Germans to surrender. Whether or not the added efficiency of guided missiles and atomic energy will cause a nation to capitulate before her armed forces

are defeated cannot be answered. In examining the effect of atomic energy and guided missiles on the principle of objectives, we must remember that the enemy's armed forces will be launching guided missiles at our country. Will not, then, the proper objective of our armed forces be the destruction of the enemy armed forces? (Initially this destruction may be aimed at strategic launching areas for guided missiles, and stock piles of guided missiles and atomic bombs.)

In summary, the following thoughts are offered on the principle of the objective. In war, the nation, its military forces, and each element thereof must have its objective. The selection of military objectives for the armed forces will depend on political, economic, and military factors, which in every case will vary in force and effect. However, the following principles generally apply:

(1) The first objective is the destruction of the hostile armed forces.

(2) The second objective is to gain possession of localities which will attain the first objective or contribute thereto.

The top military and political leaders must determine the military objectives for our armed forces, keeping in mind that the national military objectives must be in consonance with the national political objectives. The statement of the principles of the objective can be summarized by saying, the objectives of each element of a military force must be contributory to the attainment of the objective of the force of which it forms a part; or re-phrased, when a commander assigns an objective to one of his subordinate units he must be sure that the objective assigned contributes to the attainment of his objectives.

THE PRINCIPLE OF SURPRISE

The third principle of war has always been and will always be the most effective and powerful weapon of war . . . *The weapon of surprise!* The leader who can disturb the mental balance of his adversary is far along on the road to victory. Surprise in some form is essential to obtain the maximum results with the minimum loss. The Japanese

surprised the British by moving an Army through the supposedly impassable jungles of the Malay Peninsula and took Singapore in rear. The Japanese expected the American forces to attack at the Hansa Bay-Wewak area in New Guinea but General MacArthur put his troops ashore at the undefended air base of Hollandia, five hundred miles beyond Wewak. The Germans expected the assault on Europe to come in the Pas de Calais area and refused to believe until the later part of July that the main effort was going across the beaches at Normandy. MacArthur sent the Sixth Army ashore on Leyte instead of strongly defended Mindanao where the Japanese expected the attack. The results of the strategic surprise obtained in the cases just mentioned is well known. Similar examples with similar results could be quoted dating back to biblical days—the fruits of victory always go to the leader who obtains surprise.

Consider a few historical examples of tactical surprise and their effect. At Chancellorsville in the Civil war, General Hooker was making a wide envelopment of the Confederate left. The phenomenal march made by Stonewall Jackson's so called foot cavalry to envelope the enveloper is a familiar story. Stephen Vincent Benet and Fletcher Pratt describe vividly in their books, "John Brown's Body", and "Ordeal by Fire", the consternation and panic among the Federal troops when the blood curdling rebel yell disturbed their placid preparations for supper. The whole Federal flank rolled back like a carpet. The panic among the Federals was such that the way to Washington was open but due to the death of Jackson, all the fruits of surprise were not gathered. At Shiloh the Confederates gained complete tactical surprise over the security weak Federals. The grim determination and bull dog tenacity of Grant denied the Confederates a clear cut victory but the bloody losses of the Federals makes their claim to a technical victory a Pyrrhic one.

A perfect example of the remarkable results that can be obtained by surprise on the lower tactical level is illustrated by the action of a rifle company on Biak Island off the

coast of Dutch New Guinea. Our forces had pushed the Japanese out of their main positions and they had withdrawn to positions in the hills. In the process of feeling out these positions a company had been sent out along a razor back ridge to seek out and destroy a Japanese light antiaircraft battery. At 1700 the company halted and began to dig in for the night. No security was established to cover the company while they were digging in. Suddenly the Japs opened up with a burst of machine gun and small mortar fire. Surprise was complete! The men who had laid their individual weapons aside while they were digging, abandoned their weapons and ran like rabbits with the exception of one lieutenant and a handful of men. The lieutenant and his group held off the enemy until the lieutenant discovered that his company commander was gone and he then withdrew in good order. The battalion commander went forward to investigate the action and discovered a panic stricken mob. Although the action took place about six or seven hundred yards from the battalion command post, the battalion commander and party had hardly left the CP before they had to tackle a wildly running, weaponless, panic stricken soldier to stop him long enough to talk to him. The man was so badly upset that he could only stutter that B company had been wiped out to the last man. A few yards further along the trail the battalion commander met the company commander with 16 men. Even the company commander could not give a coherent story of what had happened. He was convinced that he had lost all of his company except the small party with him. But even as he talked more panic stricken soldiers came pouring down the trail. It was quite evident that the company had not been wiped out. A few yards further down the trail the battalion commander met the lieutenant with a handful of men retiring with the wounded. A check revealed that three men had been killed and five wounded. It was later discovered that the Jap attack had been made by 20 men, supported by two machine guns and an undetermined number of knee mortars. By utilizing the effect of a sudden surprise burst of fire, twenty men had completely shattered the morale of an entire company. The mental balance of the

company commander and his men had been completely upset by surprise. It might be surmised that poor leadership had more to do with this company's failure than did surprise, which brings up the next point.

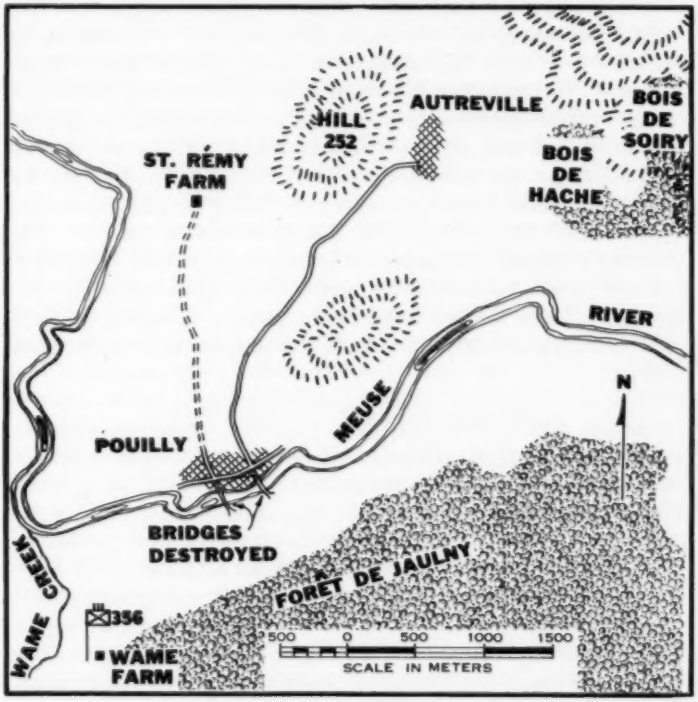


FIGURE 66.

How does a leader obtain surprise? *Surprise is not obtained by the routine and obvious. Surprise is obtained by recourse to the daring and dangerous, and hence unexpected.* Surprise is obtained by use of new weapons, unexpected direction of attack, unexpected strength of attack, or unexpected time of attack. Surprise usually means taking a calculated risk, or making careful plans to deceive the enemy, or both. The action of the 356th Infantry

in the first world war illustrates elaborate plans for deceiving the enemy and the assumption of a calculated risk to gain surprise (figure 66). On November 7, 1918 the U.S. 356th Infantry Regiment was ordered to cross the Meuse. The old bridge sites at the town were the obvious places to cross; the river was shallow at these points and a crossing would be comparatively easy. Every effort was made to make the enemy think a crossing would be made there. Lumber for rafts was imperfectly camouflaged in the edge of the woods opposite the town. At night men pounded on boards in an old quarry just opposite the bridge sites to simulate the building of rafts. The actual crossing was made very quietly at the mouth of Wame Creek and without an artillery preparation. Surprise was complete! The German artillery fire came down on the old bridge site opposite the town and the men making the crossing were unmolested. Surprise can be obtained only by careful planning to deceive the enemy and willingness to take a calculated risk.

THE PRINCIPLE OF SECURITY

If surprise is so effective, the question that naturally follows is how can a commander avoid being surprised? The answer to this question is embodied in the fourth principle of war, the principle of security. This principle is best defined as all measures taken by a command to protect itself from the enemy. It may include everything from postal censorship to posting security detachments in the field. Security seems so self-evidently necessary that it is almost pedantic to discuss it. Anyone who has ever taken boxing lessons remembers that he was taught to protect himself from a possible counter blow even as he struck at his opponent. Yet history is full of thousands of examples of commanders, from army commander down to the platoon leader, who have suffered defeat because they failed to properly provide for security of their command. The historical examples of surprise just discussed illustrate results of the lack of security. At Chancellorsville the Confederates actually burst out of the woods within a few yards of where the Federals were cooking supper. At

Shiloh it was said that if the Confederate commander had been allowed to order the Union army's dispositions he would have made no changes, so faulty was their security. The rifle company surprised on Biak Island had no security at all—had the company commander sent security posts as far as 20 yards beyond the edge of the company perimeter he would have discovered, before it was too late, the enemy who routed him. All commanders pay lip service to security. It is stressed in publications and in training exercises. The question then follows, how does it happen that commanders are so frequently lax in security measures? The answer can be found in the moral and intellectual qualities of the leader. Some leaders do not have the intellect necessary to correctly read the danger signs that warn of the urgent necessity for security measures, or after having posted security, time and time again, and finding that the enemy did not attack, they acquire a false sense of security. Others do not have the moral force necessary to whip a tired body and an exhausted brain to exert that last bit of energy necessary to formulate and order security, or they lack the moral force necessary to force equally tired subordinates to properly carry out security measures.

THE PRINCIPLE OF COOPERATION

The fifth principle, *Cooperation*, is often termed the principle of *unity of command*, or the principle of team play. Unity of command means that each commander has supreme command of his unit and can hence plan and enforce cooperation between its subordinate elements. Bitter experience has taught that cooperation without unity of command is difficult to obtain. During the first three years of the Civil War the Federal forces had no unity of command except that exercised by Secretary of War Stanton, of whom one writer has said; "His contempt for the principles of war was only exceeded by his ignorance of them." In the relatively small area of Virginia, the Federals had at one time the Mountain Department, The Valley Department, The Department of the Rappahannock, and the Army of the Potomac —all under separate commanders. There obviously could

be little cooperation of these forces even if the commanders desired to cooperate. Only after General Grant was appointed supreme commander was unity of command and coordination of all these armies toward a common objective achieved.

Unity of command will not always insure cooperation. An uncooperative subordinate commander may fail to carry out the spirit and intent of his commander's orders in which case the unity of command fails to obtain cooperation. However, unity of command allows the commander to relieve the uncooperative subordinate. Unity of command may also fail to obtain cooperation in cases where the higher commander fails to properly exercise command and thus fails to enforce cooperation. This error is well illustrated by the battle of Tannenberg. In the early days of August 1914, a Russian Army Group commanded by General Jilinsky, was making a premature offensive against the German Eighth Army which had the mission of defending East Prussia while the main strength of the German Army was engaged with France and England in the west. The Russians advanced on a 200 mile front with the First Army, commanded by Rennenkampf, on the north and the Second Army, commanded by Samsonoff, on the south with the chain of Masurian Lakes between them. The German Eighth Army surrounded and destroyed the Russian Second Army while the Russian First Army remained inactive. Jilinsky failed miserably to command. He even failed to keep Rennenkampf informed of the critical Second Army situation thus making it impossible for him to voluntarily cooperate with Samsonoff. However, two commanders are not excused from cooperating with each other just because the next higher commander fails to exercise supreme command. Had Rennenkampf known of the situation at the battle of Tannenberg and then failed to cooperate he would have been guilty of criminal neglect of duty.

The Army is organized so as to provide unity of command to facilitate the enforcement of cooperation between units but unity of command alone will not always insure cooperation—in the final analysis, it is the supreme commander

who determines the degree of cooperation between subordinate elements of the command.

THE PRINCIPLE OF THE OFFENSIVE

The sixth principle of war is the principle of the *offensive*. "Victory can be won only as a result of offensive action." "Decisive results can be obtained only by the assumption of a vigorous offensive." "He who thinks solely of parrying can at best avoid defeat." These quotations from military writers are typical of the platitudes used in discussing this principle of war. All of the great captains agreed on this principle. The defense offers many attractions such as knowledge of the ground, natural and artificial cover for the defender, convenience of established supply routes and ease of reinforcement,but they are all illusory advantages. The offensive has the advantage of the initiative, hence the power of maneuver and hence the surprise concentration of superior combat power at the selected point. Above all, the offensive carries with it higher morale, a factor that Napoleon counted 2 to 1 over mere numbers. Still another advantage results from the fact that fewer casualties are sustained by offensive action; an unsuccessful defensive is very costly in personnel killed, wounded, and captured.

The principle of offensive does not mean that we should always be on the offensive. In fact, offensive action should never be undertaken unless conditions promise it a reasonable chance of success. The French offensives in 1870 and 1914 are good examples of the near disaster that overtakes a force that assumes the offensive without the necessary means. The cry "on to Richmond" caused a premature Federal offensive in the Civil War which resulted in the disaster at Bull Run. An unjustified offensive attitude is as bad as an unjustified defensive attitude.

The statement to the effect that the offensive is undertaken only when a reasonable chance of success is present indicates that a commander may be forced to temporarily adopt the defensive. This was true in the last war; it was

1943 before the Allies assumed the offensive on all fronts. In the diversity of modern war some of our forces may find themselves on the defensive even when our Armed Forces as a whole are on the offensive. The Battle of the Bulge is a good example. The defensive is not to be despised and the principle of the offensive does not imply that the defense is to be ignored.

THE PRINCIPLE OF MOVEMENT

The seventh principle of war is the principle of *movement*. The term movement as here employed means the maneuver of combat elements. Movement is instrumental in the application of the principles of mass and surprise. Napoleon said, "when, with smaller forces, I was in the presence of a great army, I rapidly grouped my own and fell like lightning on one of the wings which I destroyed. I then took advantage of the disorder which such a maneuver always caused in the enemy's ranks to attack him at another point, always with all my forces." The massing of troops at the decisive point is usually the result of a rapid and unexpected movement. The battle of Chancellorsville is an excellent example. By an exceptionally rapid flanking march, Jackson was able to mass his corps on the Federal right flank to gain surprise and a victory.

Outside of the combat area movement is made certain by the efficient use of all means of transportation available. The battle of Tannenberg is an excellent example of how quick movement on a grand tactical scale concentrates mass and obtains surprise leading to victory. As previously mentioned, the Russians were making an offensive against the German Eighth Army commanded by General Prittwitz who had the mission of defending East Prussia. The Russians advanced with two armies abreast on a two hundred mile front with the First Army, commanded by Rennenkampf, on the north and the Second Army commanded by Samsonoff, on the south, with the chain of Masurian Lakes between them. The Second Army was about two days behind the First Army. On the 17th August, German I Corps engaged in a drawn battle with elements of the Russian

First Army and I Corps withdrew. Rennenkampf halted and dug in to await his supply trains. On 20 August, the German Eighth Army made what amounted to a piecemeal attack on the Russian First Army. The Germans were successful on the north flank but met local reverses in the center and south flank. The box in the upper right hand corner of figure 67, shows the situation in front of the First

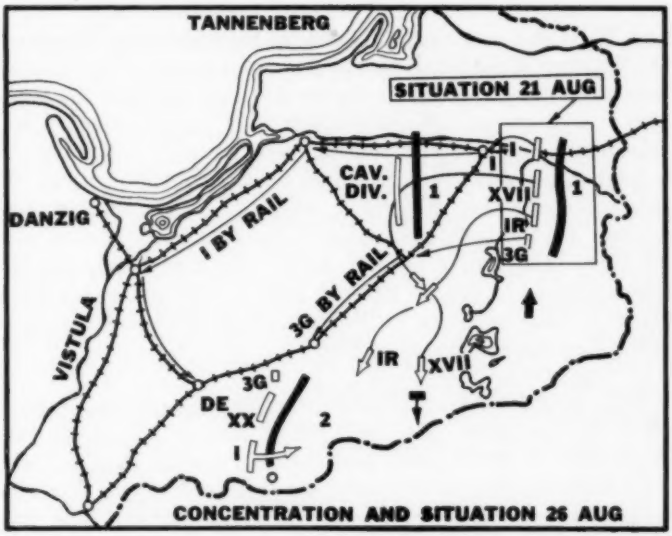


FIGURE 67.

Army as it existed after the fighting on the 20th. The commander of the XVII Corps exaggerated his reverses in his report to Prittwitz and at the same time word was received that the Second Army, which was faced only by the XX Corps, was crossing the frontier to the south. This was too much for Prittwitz. Without consulting with his staff he called the GHQ at Coblenz and reported that he was withdrawing to the Vistula and would need more troops if he were to hold the line of the Vistula. (It was then that Von Moltke decided he needed a new army commander.) Prittwitz's staff later succeeded in convincing

him that, since the Second Army was closer to the Vistula than the German Eighth Army, it would be necessary for the Germans to concentrate against the Second Army before the retreat beyond the Vistula could be made. Prittwitz agreed and his staff worked out a plan of movement for shifting the bulk of the German strength from the north to the south in front of the Second Army. (Prittwitz failed to notify the GHQ of his change of plans.) The move began on the 21st of August (see figure 67). The I and XVII Reserve Corps moved by marching and attacked the Russian right flank on the 26th of August. The I Corps moved by rail as shown in figure 67, and attacked the Russian left flank on 27th of August. (I Corps moved a total distance by rail and marching of roughly 400 miles in a total of six days.) The Third Guard Division moved by rail and marching to attack with the XX Corps in the center. On the 29th of August, Samsonoff knew that it was all over. His entire Second Army was destroyed. Rapid movement on a grand tactical scale permitted a surprise concentration of mass to the front and flanks of the Second Army for a brilliant victory.

This battle offers a second example of rapid movement on a smaller scale. On the 17th of August, the first day of contact of the Russian and German forces, the 1st German Division at Stalluponen (see figure 68) was about to become surrounded by superior Russian forces. The 4th Infantry Brigade, one regiment of field artillery, and one squadron of cavalry was in position at Tollmingkehmen. The brigade commander knew of the situation of the 1st Division to the north and he also knew that an enemy division was advancing against him as shown in figure 68. He quickly made a decision to send two infantry battalions, the cavalry squadron, and one battery of field artillery to establish a defense at Mehlkelmen. With the remainder of the brigade, he made a rapid 12 mile march as shown in figure 68, to attack the Russians in rear. The Russians withdrew in great disorder and with heavy losses. The delaying force to the south carried out its mission of delaying the Russian division. Impending defeat had been turned

into victory by a rapid movement of forces. A vastly superior number of Russians had been defeated by a faster thinking, faster moving opponent.

Rapidity of movement means more than fast marching whether the marching be by motor or foot. It requires from the leader, anticipation of the probable course of action and anticipatory planning, prompt decisions, clear and concise orders, and rapid, sure means of transmitting orders.

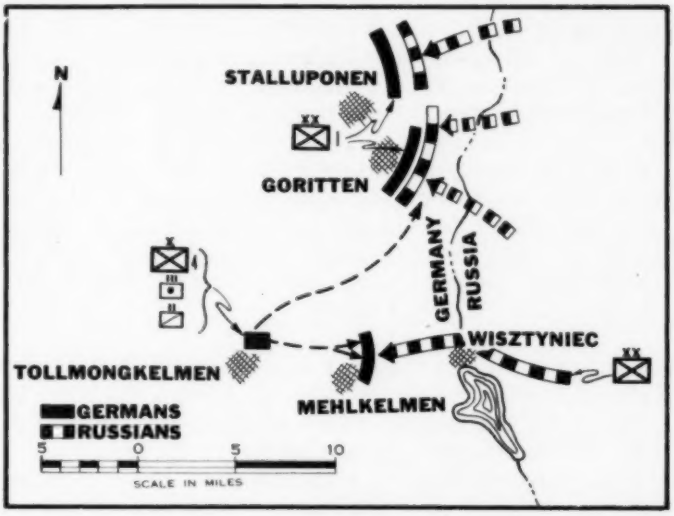


FIGURE 68.

THE PRINCIPLE OF ECONOMY OF FORCE

The eighth principle of war, the principle of *economy of force*, is a corollary to the principle of mass. By economy of force we permit the concentration of mass at the decisive point at the decisive time. The battle of Tannenberg is an excellent example of economy of force. The plan for the concentration of the Eighth Army against the Second Army called for containing the entire Russian First Army with one cavalry division (see figure 67). Once the decision had been made to strike the Russian Second Army, all the force

that could possibly be spared was used. While Hindenburg, who relieved Prittwitz, was properly applying the principle of economy of force in grand tactics at Tannenberg, Von Moltke, Supreme German Commander, failed to apply it strategically. Swayed by Prittwitz's call for help, Moltke sent two corps and one cavalry division from the critical western front to the east. These troops arrived too late to assist in the battle of Tannenberg and were enroute when the critical battle of the Marne was fought. Two additional corps might have changed the outcome of the First Battle of the Marne.

Napoleon's twenty-ninth maxim reads as follows: "When about to deliver battle it is the general rule to concentrate all your forces and to neglect none. One battalion often decides the day." This might indicate that detachments from the main forces could never be justified, however, such is not the case. Any detachment that holds a larger enemy force away from the decisive point at the decisive time is obviously justified. Before the first battle of Bull Run, Johnston was detached from the main Confederate Army with a small force to hold Patterson, who had a much larger force, in the valley. Johnston not only held Patterson but was able to withdraw in time to take part in the Battle of Bull Run.

In all military history one finds no better examples of failure to apply the principle of economy of force than in the Federal campaigns during the first years of the Civil War. When McClellan was moving up the peninsula toward Richmond, the federal officials insisted on keeping 40,000 men to protect Washington. The many different commands maintained by the Federals in the Virginia area made economy of force impossible. McClellan sent several expeditions against southern ports which accomplished nothing but detaching troops from the Union Army and, once the ports were taken, freeing Confederate garrison troops to join their army in the field. The Union forces took Pensacola and the 10,000 Confederate troops who had been defending the place were freed for action in the field and arrived in the west in time to take part in the battle of Shiloh.

When unjustified detachments are made it usually means that the commander responsible has lost sight of, or does not know, his proper objective. Only by strict economy of forces can any commander have the mass of his forces at the proper place at the proper time.

THE PRINCIPLE OF SIMPLICITY

The last principle of war is the principle of *Simplicity*. All combat soldiers are familiar with the utter confusion of combat. From first hand experience they know of intermingled units. loss of control, loss of direction, late orders,

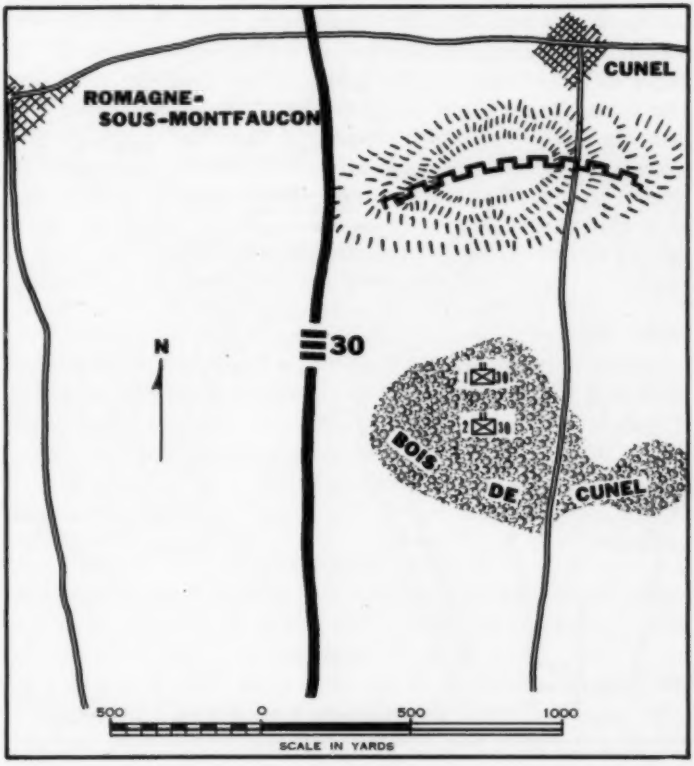


FIGURE 69.

and unforeseen circumstances. Fatigue, hunger, and unfavorable weather plague troops carrying out their commander's orders. Failure to take into account these unfavorable factors of combat when formulating a plan is to invite disaster. The confusion, fog, or friction of war makes difficult the execution of complicated plans. In combat the simplest way is usually the best way. Simple plans, clear concise orders, and formations that facilitate control will smooth the way for subordinate elements. The following

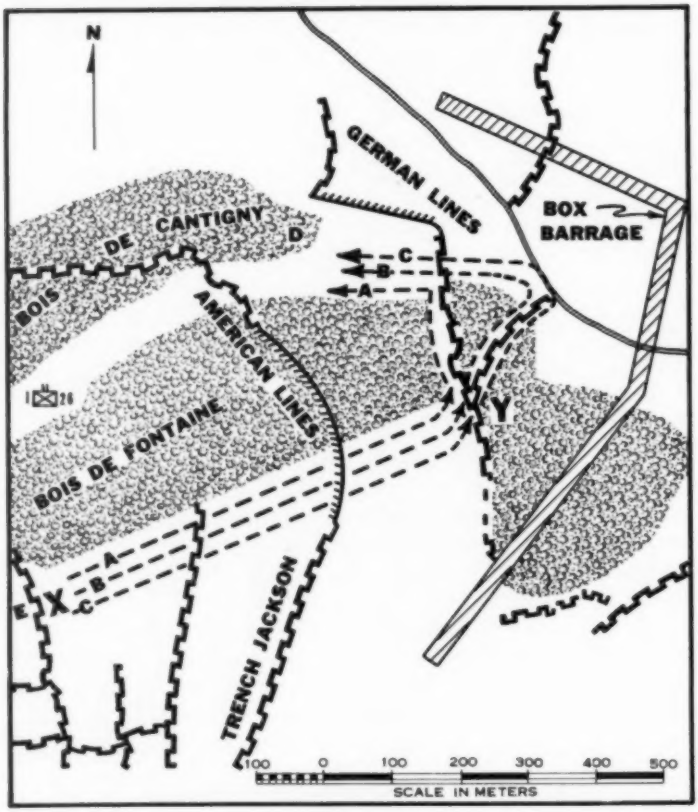


FIGURE 70.

two examples taken from World War I illustrate the principle of simplicity.

Figure 69 shows the situation that confronted the U. S. 30th Infantry on October 10, 1918. The regiment was ordered to attack toward the town of Cunel. The first battalion was to lead the attack, the second battalion to follow in support, the third battalion was in brigade reserve. The first battalion moved out at 0700 and moved about 500 yards from the woods when it encountered devastating fire from the front and both flanks. The second battalion had not left the woods. The first battalion could not move forward or backward without suffering undue casualties. Later in the day the division commander ordered that the trenches in the 30th Infantry's sector be taken at once. The following plan was adopted to carry out the mission. The first battalion would withdraw under the cover of darkness, reorganize and attack again at 1930, following a rolling barrage. The second battalion was to follow in support. The orders for such a plan could be simply stated and easily understood.

The order for the second example is lengthy and is reproduced in part. The sketch referred to in this order is figure 70. On June 29, 1918, Company D, U.S. 26th Infantry, carried out a raid on German positions near Cantigny. The hour set for the action was 3:15 a. m., at which time there was just enough light to see. Part of the order for this raid follows:

HEADQUARTERS 1ST BATTALION
26TH INFANTRY

FIELD ORDERS
NO. 10

France, June 24, 1918.

INFORMATION

The enemy is occupying the woods to our front with one battalion, something in the manner indicated in the attached sketch.

INTENTION

On J Day at H Hour, we will raid the Wood, entering the woods at the angle 22.8-30.4 (point Y on sketch), and kill or capture the occupants of the trenches running north and northeast as far as the northern edge of the woods, returning from there by the northern edge of the BOIS de FONTAINE.

ALLOTMENT OF UNITS

The raiding party will be composed of personnel of Company D, 1st Lieutenant Wesley Freml, Jr., officer commanding raid.

(1) Lieut. Dillion —1 Sgt. —2 Cpls. —12 Pvts. —A Party
(2) Lieut. Dabney —1 Sgt. —2 Cpls. —12 Pvts. —B Party
(3) Lieut. Ridgley —1 Sgt. —2 Cpls. —12 Pvts. —C Party
(4) Lieut. Tillman —1 Sgt. —2 Cpls. —12 Pvts. —D Party
(5) Lieut. Freml (O. C.) —2 Sgts. —3 Cpls. —18 Pvts. —E Party
(2 stretchers and 4 stretcher-bearers.)

FORMATION

A, B, and C Parties will form left to right on taped ground at point marked X (see sketch) at H minus 30 minutes. They will each be in column of files. E Party will follow in rear in same formation. D Party will, at the same time, be disposed in observation on the extreme eastern tip of the BOIS de CANTIGNY.

SPECIAL SIGNALS

When he has assured himself that the party has withdrawn to within our own lines, the officer commanding the raid will fire three (3) star RED rockets—this will signify to all concerned that the raid is completed.

TASK

On commencing artillery bombardment, A, B, C and E Parties, preserving their general alignment, will advance as close as possible to the woods.

A, B, and C Parties, in the order named from left to right, will advance directly into the woods. If opposition is encountered, B Party will hold with covering fire from the front, and A and C Parties will advance by the flanks, outflanking the resistance.

On entering the woods, A Party will split off to the left branch of the trench to the north edge of the wood, capturing or killing all occupants and from that point it will return.

B and C Parties will continue down trench running to the north east, outflanking tactics being employed when necessary. On reaching north edge of the woods, they will function the same as A Party.
E Party will follow in rear. It shall be its particular function to guard the right flank and reinforce the assaulting parties when necessary.

D Party will remain in observation in its original position, ready to engage with fire any machine guns that may open from the slope of the ridge or northeast of the woods. It will retire on completion of the raid.

* * * * * * * * * *

THEODORE ROOSEVELT, JR.
Major (USR), 26th Infantry
Commanding

Information and instructions as to fire support, dress and equipment, and many other details were included. The assault parties were directed to move forward during a ten-minute preparation by artillery and Stokes mortars. A box barrage would then be formed, while the infantry rushed the position. The plan called only for those supporting fires normally available in the sector. The position and routes followed by the assault parties are indicated on the sketch.

Which plan correctly applies the principle of simplicity and why? Oddly enough, the latter plan, although apparently much more complicated, is actually far more simple. It requires some time to digest thoroughly and understand but its execution is simple. The artillery and mortars fire on a time schedule. The assault parties' routes parallel the edge of the woods. After they have gained the enemy trenches each party had a definite terrain feature to guide them. The return trip was guided on the other edge of the woods. Once the order was digested and understood the execution of the plan was simple. The plan succeeded and the raid was a success. Now consider the first example.

The plan of the first example could be simply stated and understood but how about the execution of the plan? What actually happened? The first battalion withdrew as soon as it was dark and became hopelessly intermingled during the withdrawal. To add to the confusion, the German artillery lashed the woods with violent and tireless energy. H-hour approached and passed with the battalion commander still trying to gain control of his unit. At ten o'clock the second battalion passed thru the first and successfully took the objective. This plan called for a battalion that had been pinned down all day to withdraw during darkness and reorganize for a night attack. The men were bound to be tired, thirsty, and hungry. The second battalion had not been engaged, had plenty of time to make daylight reconnaissance and plans for a night attack, yet the original plan called for the use of the first battalion as the assault battalion. Simple orders do not necessarily make simple plans. It is the execution that counts.

The principles of war have been briefly covered. It has been pointed out that they are as applicable to minor tactics as to grand tactics and strategy. It is not difficult to understand them but these principles are difficult to apply. Leaders who would successfully apply these principles in war must study them and their application to concrete examples on the ground. The really great leaders must also develop the moral force necessary to apply these principles under the nerve shattering conditions of modern combat. To assist in remembering the principles of war the following code word is recommended—MOSSCOMES—Mass, Objective, Surprise, Security, Cooperation, Offensive, Movement, Economy of Force, and Simplicity. Mosscomes is the code word. Remember the code word by remembering that moss will come to the brain of the soldier who neglects in peace, to study and prepare himself for war.

CHAPTER 11

Use Six Stovepipes

This article is based on the 81-mm Mortar Platoon as organized under TO/E 7-18 dated 1 June 1945 which provides three sections of two 81-mm mortars per platoon. All information contained in this article applies equally to a platoon organized under proposed TO/E 7-18 dated 1 July 1946, which allocates two sections of two 81-mm mortars per platoon except that position areas for the weapons and dispersion areas for mortar concentrations must be reduced.

"FIRE MISSION, REFERENCE POINT NO. 2, LEFT 200, ADD 100, MACHINE GUN, WILL ADJUST." Although this may sound like an artilleryman talking, it can just as well be an infantry mortar observer adjusting a platoon of 81-mm mortars on an enemy target. During World War II it was found that the employment of the mortar platoon in battery was practical and paid big dividends. Particularly in the Pacific Theatre where lack of good roads handicapped the artillery, and the infantry battalions were forced to depend to a great extent on the firepower of the 81-mm mortar for their close supporting fires, did this method of employment become normal procedure. On Bougainville, for example, one mortar platoon of the 37th Division secured six additional mortars and formed two batteries of six mortars each. In four hours these two batteries fired twenty three concentrations expending a total of 5000 rounds of HE light ammunition.

Today, at The Infantry School, the employment of mortars by platoon in battery is stressed. Two methods of employment are taught: One is the massed battery in which the mortars are located in a restricted area, and the other

is the split battery in which the sections are widely separated. The conduct of battery fire in both cases is essentially the same, and while the following considerations deal mainly with massed battery, they apply equally well to the split battery.

This article considers platoon fire from the standpoint of the four factors which influence its employment: selection of position, communication, observation, and fire control.

SELECTION OF POSITION

In addition to placing the platoon in defilade and providing for concealment and cover of the individual mortar, it is particularly important that the battery position favor resupply since the platoon can expend a large amount of ammunition.

The size of the area occupied by the platoon depends on the nature of the terrain; however, it should be limited to an area approximately 150 yards by 100 yards. Normally, three mortars spaced 30 to 35 yards apart are placed in the forward portion of the area and the other three are echeloned in depth behind them. In this manner no mortar will fire directly over another unless an extreme angle of shift is made, and protection, as a result of dispersion and emplacement in depth, is gained without sacrificing control. In some cases it may be necessary to place the mortars in line, in an arc, or in some other formation; in any event, it must be remembered that the battery concentrations fired will correspond in shape and coverage to the positions of the mortar in the battery. A battery with the mortars laid parallel and staggered in depth within an area 150 by 100 yards can fire a concentration that will effectively cover an area approximately 200 yards by 150 yards with five rounds per mortar.

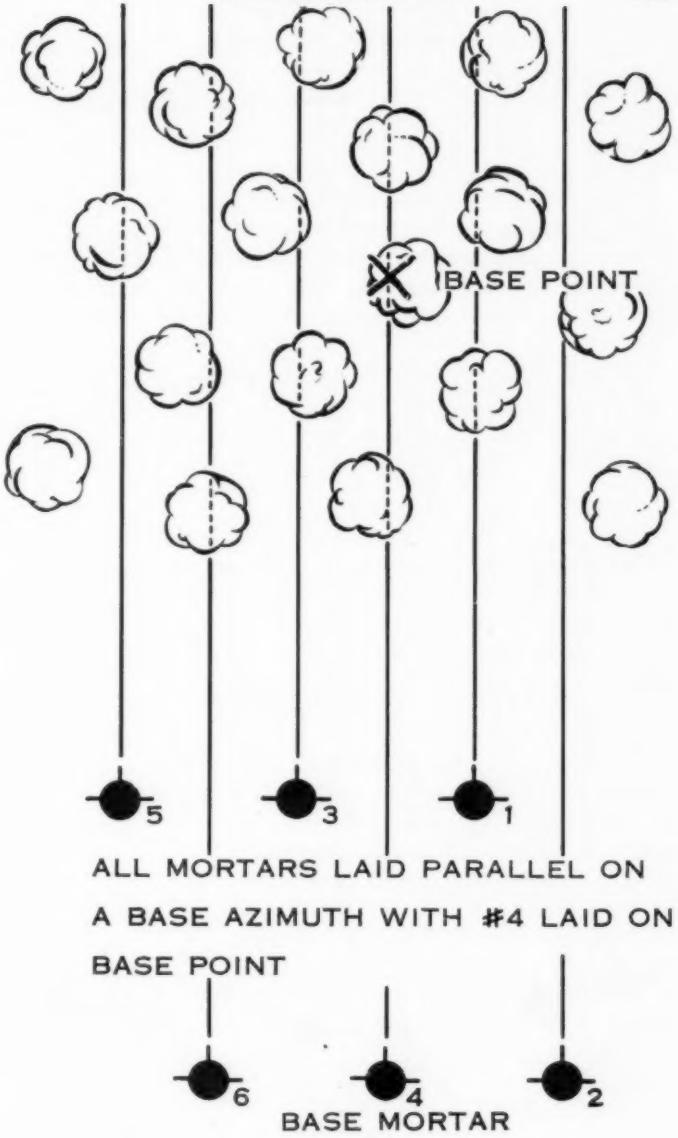

BASE POINT
5
3
1
ALL MORTARS LAID PARALLEL ON
A BASE AZIMUTH WITH #4 LAID ON
BASE POINT
6
4
2
BASE MORTAR

FIGURE 71.

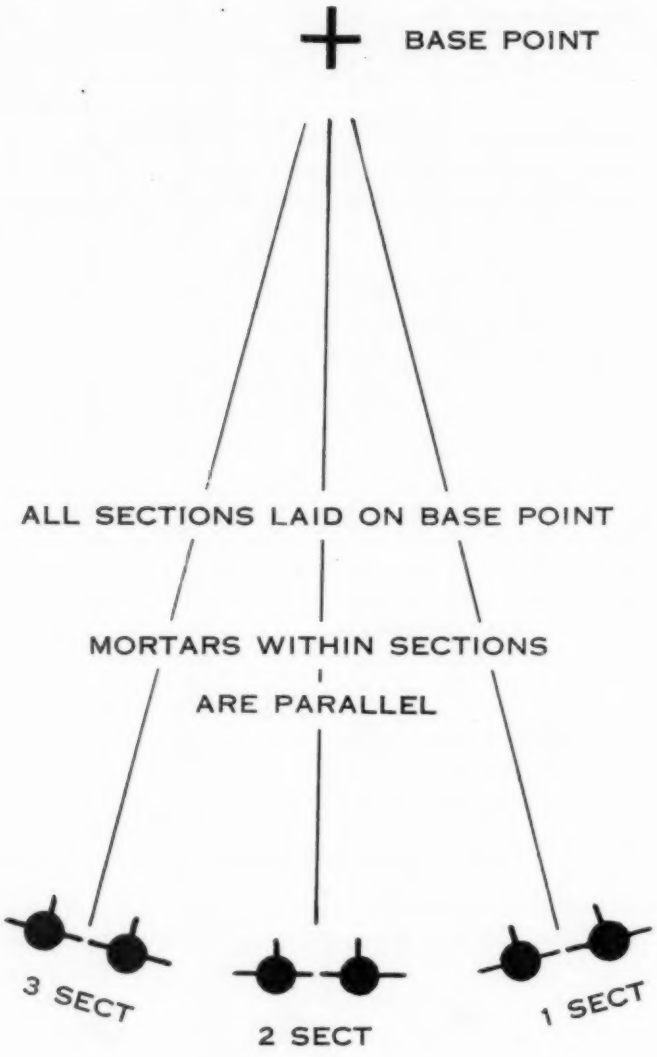

BASE POINT
ALL SECTIONS LAID ON BASE POINT
MORTARS WITHIN SECTIONS
ARE PARALLEL
3 SECT
2 SECT
1 SECT

FIGURE 72.

COMMUNICATION

Normally, the 81-mm mortar platoon is allotted three of the five SCR 300s authorized in the heavy weapons company. This radio fills the mortar platoon's needs very satisfactorily as it is dependable, has adequate range, and is simple to operate. The radio operators are key men in the platoon and should be qualified mortar men since this training facilitates the transmittal of messages. The normal assignment of the SCR 300s within the platoon is one to each of the two observer parties and one to the control point.

The most dependable means of communication available to the mortar platoon is the telephone. At least six of the twenty CE 11 phone and wire sets in the heavy weapons company should be allotted to the platoon; two sets to be

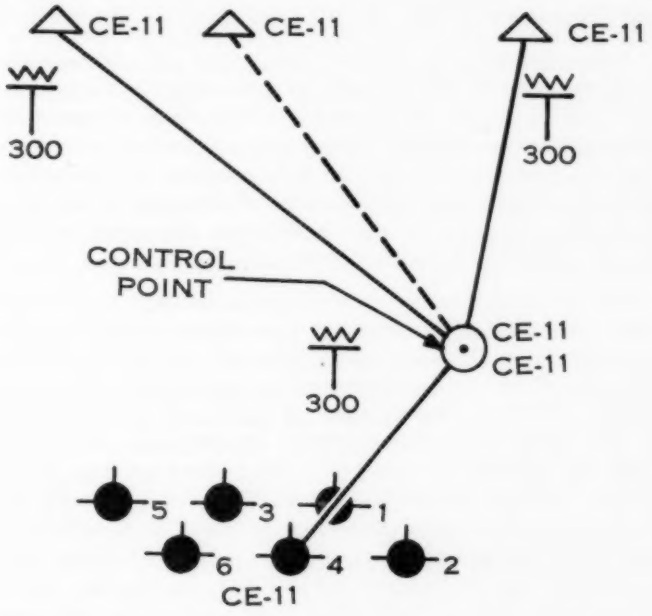


FIGURE 73.—Communications net for the 81-mm mortar platoon.

installed at the control point, three sets to accompany observers, and one set to be installed at the battery position.

In addition to the means of communication discussed, the communication facilities of the supported rifle company are available to the observer in case of emergency; however, the observer should use this means only in the event of a failure in his own communications since the rifle commander utilizes it fully.

OBSERVATION

Since well trained forward observers are essential to the conduct of battery fire, twelve men in the mortar platoon are specially trained to perform this duty: Namely, the platoon leader, platoon executive officer, platoon sergeant, three section leaders, and six squad leaders. In addition, every man in the platoon should receive training in the adjustment of fire by forward observation methods.

Normally, a party consisting of two observers and a radio operator is sent to each assault rifle company. This provides for ample replacements in the event of casualties since the radio operator also has been trained as an observer. Personnel of the rifle companies should realize that these observers are the eyes of the platoon and give them the cooperation and assistance necessary for the accomplishment of their mission.

The procedure followed in adjusting battery fire by forward observation methods is prescribed in War Department Training Circular No. 6, dated 13 June 1946. Briefly, this procedure requires the observer to estimate the error, that is, determine the location of the burst with reference to the target, in terms of yards of deflection and range from the target and report it to the control point as a correction. Using the bracketing method of adjustment, the observer makes a bold correction in range to establish the initial bracket and then continues to split the bracket until a 50-yard bracket has been established; in this manner he accomplishes the adjustment quickly and with minimum expenditure of ammunition.

One of the most important aids to the observer in the rapid designation of a new target, and consequently in the rapid delivery of fire, is the use of a base point and reference points. This is actually a phase of fire control but it is so closely tied in with observation that it will be discussed here. A target or terrain feature located near the center of the target area is selected as the base point and other terrain features, or possibly targets on which the platoon has adjusted, distributed through the area are selected as reference points. These are accurately plotted on the fire control sketch at the control point and each forward observer carries an overlay of this sketch or has the data recorded on his map. After the platoon has adjusted on these points, the location of subsequent targets can be designated with reference to the base point or the nearest reference point. Since the reference points are well distributed over the target area, the observer can generally select one which will not necessitate a large angle of shift and the platoon can place surprise fire on the target by shifting from that point and firing for effect without adjustment. For example, assume that a barn has been selected for the base point and the platoon has adjusted on this point. The observer sees a group of enemy who have halted at a position which he estimates is 100 yards to the left and 100 yards short of the barn; he sends the following target designation and request for fire to the control point:

FIRE MISSION
BASE POINT
LEFT ONE HUNDRED
DROP ONE HUNDRED
RIFLEMEN IN OPEN
FIRE FOR EFFECT

FIRE CONTROL

In the conduct of battery fire the fire is controlled from the control point; it is here that the fire missions from the observers are received, transformed into fire commands, and transmitted to the platoon. The control point is normally operated by an officer or the platoon sergeant, assisted by

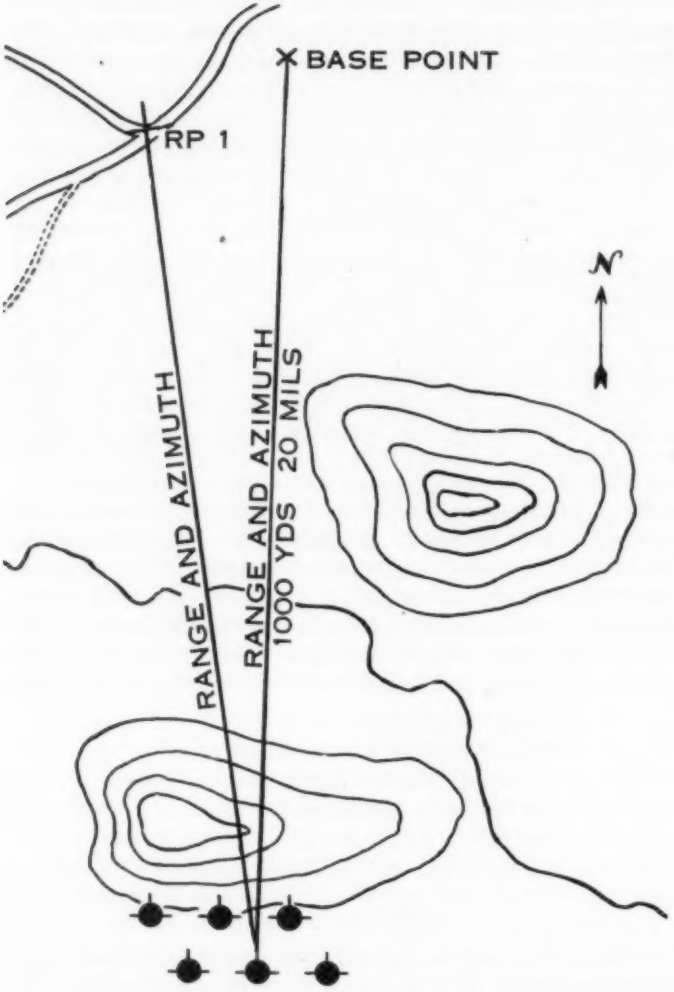


FIGURE 74.—Base point and reference point number 1 located by the sketch method.

the instrument corporal, and at least one radio operator. It is usually located in defilade convenient to, but not at, the platoon position. It maintains communication with the firing platoon by telephone.

The instrument corporal prepares and maintains the firing sketch. While the mortars are being emplaced, he selects a vantage point from which he can get a wide range of observation over the enemy area and also see the mortar position. Using his range finder and aiming circle he determines the ranges and azimuths to three or four reference points in the enemy area and to the base mortar of the platoon. He then plots this information to scale and using a range-deflection fan determines the range and azimuth from the base mortar to each reference point. One of the reference points near the center of the area is then selected as the base point and the base mortar is adjusted on it. If practicable, the base mortar will also adjust on other reference points.

As an example, consider the fire mission in which the forward observer placed fire for effect on the enemy patrol near the barn. The control point received the following request for fire:

FIRE MISSION
BASE POINT
LEFT ONE HUNDRED
DROP ONE HUNDRED
RIFLEMEN IN OPEN
FIRE FOR EFFECT

Upon receipt of this request the instrument corporal immediately locates the target on his sketch and using his range-deflection fan determines the plotted range and deflection to the target. He then announces the range and deflection to the platoon leader. The platoon leader decides to use HE light against personnel and consults his firing table to determine the elevation for that range. He then sends the following fire command to the platoon:

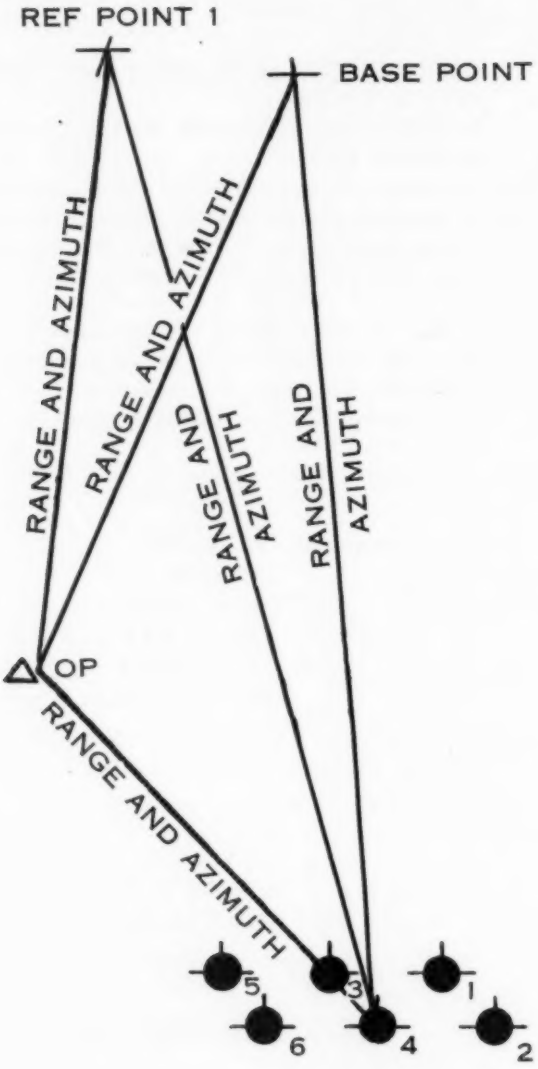


FIGURE 75.—Azimuth and range data can be plotted from an accurate map or controlled air photo.

PLATOON
HE LIGHT
RIGHT THREE FIVE, FIRST LEFT STAKE
FIVE ROUNDS
SEVEN ONE AND ONE HALF DEGREES,
CHARGE TWO

Note: The command to fire is given by the platoon executive officer at the mortar position when the platoon is ready.

Accurate maps, aerial photos, or the M10 Plotting Board may be used, as well as the sketch method for determining firing data.

The fire commands which are used in the conduct of platoon fire follow the standard sequence as prescribed by Training Circular No. 11, 1946. For example:

1. The commands contain the following elements in sequence:

a. Pieces to follow the command	PLATOON
b. Type of Ammunition	HE HEAVY
c. Fuze	TIME 20.1
d. Direction	RIGHT TWO ZERO, FIRST LEFT STAKE
e. Distribution	CLOSE FIVE TURNS ON BASE SECTION
f. Pieces to fire	(Omit when same as *a*)
g. Method of fire or number of rounds	FIVE ROUNDS
h. Elevation	SIX NINE DEGREES CHARGE ONE
i. Command to fire	AT MY COMMAND—FIRE

Or, elements may be omitted when not applicable as in the following:

PLATOON
HE LIGHT
RIGHT THREE ZERO, FIRST RIGHT STAKE
NUMBER FOUR
SIX FOUR AND ONE QUARTER DEGREES,
CHARGE ONE

Note: When single mortars are firing the announcing of the elevation is the command to fire when ready. The gunner at the firing mortar gives the command FIRE.

2. Subsequent fire commands include only elements that are to be changed, except that the elevation and the command to fire are always announced. In the following example the platoon is laid parallel and the base mortar of the platoon is to make a base point adjustment.

PLATOON
HE LIGHT
ZERO, STAKE
NUMBER FOUR
ONE ROUND
SIX EIGHT AND ONE HALF DEGREES, CHARGE ONE

A subsequent fire command would be:

PLATOON
RIGHT TWO ZERO
NUMBER FOUR
SEVEN TWO DEGREES, CHARGE ONE

At the completion of this adjustment, the control point commands PLATOON MARK BASE DEFLECTION, PLACE OUT SIX (or desired number) ADDITIONAL AIMING STAKES.

3. The following is an example of an initial fire command to shift the entire platoon from the base point to fire for effect on a new target:

PLATOON
HE LIGHT
LEFT FIVE ZERO, SECOND LEFT STAKE
FIVE ROUNDS
FIVE NINE DEGREES, CHARGE ONE
AT MY COMMAND

4. The following is an example of a fire command to close the sheaf of a platoon laid parallel:

PLATOON
HE LIGHT
RIGHT ONE ZERO, RIGHT STAKE
CLOSE FIVE TURNS ON BASE SECTION

FIVE ROUNDS
SEVEN TWO DEGREES, CHARGE TWO
AT MY COMMAND

These examples do not include all types of fire commands for the platoon as different types of fire will call for variations in the commands, however, all of the basic elements are illustrated.

Notice that since the angle of elevation and the charge are included in the fire command, the gunner is not required to make this calculation thus eliminating one source of possible error in the delivery of fire.

Unless otherwise specified by a command, the platoon or mortar will fire only one round. However, if it is desired that the platoon fire more than one round, the number of rounds must be announced.

A gunner or leader may ask for an element of the command to be repeated. In such a case the control point will preface the command to be repeated by saying, "THE COMMAND WAS....." This phrase is used only when repeating an element of an unexecuted fire command. To correct an element of a fire command which has been given incorrectly the correct wordage is, "ERROR" followed by the correct command. The termination of a firing mission should be followed by the command, "MISSION ACCOMPLISHED." This allows the mortar crews to relax from the firing alert.

From this discussion of platoon fire it can be seen that the employment of the platoon in battery is practical and involves no complicated procedures or computations. The trend toward this employment has received encouragement in the form of the standardization of fire commands and the adoption of forward observation methods. Thus it is possible for either an artillery observer or an infantry observer to act as the eyes of the platoon. To take advantage of this fact, the mortar platoon should be used in battery in order that the maximum firepower of the platoon is placed at the disposal of the rifleman.

CHAPTER 12

Night Vision and Infrared Illumination

PART I

The plan for attack was all set. The attack was to be launched at 0500 hours. The battalion commander was nervous and jittery. In less than 30 minutes he would be leading his battalion into its first attack. His mind was in a turmoil, for prior to the landing he had hoped that the French would not resist, but that hope was quickly dissolved when the first battalion failed to take their objective; the same objective that he was assigned to take in this attack. If E Company and the platoon of tanks attached to it, could knock out the strong position in front of the town, he reasoned, the town could be taken easily. As his mind touched on the part the tanks were to play, he realized they had not yet reported to him. He knew that without the fire power of the tanks, his green troops would fare as badly as the first battalion against the French strongpoint.

Impatiently, he telephoned the regimental commander to inquire about the tanks. The response he received was short and brief, "The tanks left here two hours ago. Get someone out to find them. I want you to jump off on time with or without tanks! Division wants that town taken today."

When the attacking elements jumped off without tank support, they were subjected to well-directed fire from dug-in emplacements. Without tanks to knock out the enemy pillboxes, the attack soon bogged down. The mission was not accomplished.

Why had the tanks failed to arrive on time? The tank platoon leader had been carefully briefed on his mission. He had less than eight miles to traverse in darkness with

his tanks. The answer laid with the driver of No. 2 tank. He was an excellent driver in the training area, but on this night run—his first in complete blackout—it developed that he lacked night vision. He crawled his tank along at very slow speed, retarding the entire column. At a low culvert crossing, one track slipped off the road and the tank was hung in such a position as to completely block the road.

The tank column was halted. The platoon leader tried to pull the tank back on the road with a second tank without success. Fearing to break radio silence, the platoon leader sent one of the other tanks back to the company area to bring forward a tank retriever.

As a result of the tank driver's night blindness, the tanks did not arrive in the battalion area in time to support the infantry troops and the attack failed.

Did the Army know that such a thing as night blindness existed? Yes, the problem of night vision was recognized early in 1942 when the War Department published Training Circular 44, 24 July 1942. This circular stated that "For night operations it is essential that troops be trained to avail themselves of all existing means whereby night vision and the ability to observe are improved." At the time the actual incident related above took place, the War Department was conducting research to determine whether an individual's ability to see at night could be measured and *if it could be improved.* After a series of controlled experiments the following results were published:

> *a.* The human eye is capable of seeing objects under conditions of illumination that approach darkness and this degree of man's natural ability to see at night can be measured.
>
> *b.* With lack of usage in every day life the eye has lost some of its inherent ability to adjust its vision to darkness. This adjustability can be augmented by training the eye and that portion of the brain concerned with vision. The mind area must be trained to acknowledge the fact that familiar objects in daylight vision appear different at night.

Thus, by approaching the subject from the scientific viewpoint it has been determined that night combat is a sound military procedure. The findings, however, do not represent a new trend of thought or doctrine, as history records that night combat dates far back into the centuries. The earliest recorded battle is the night action of Moreh, about 1250 B.C., in which Gideon, the leader of the Israelites, won a decisive victory over the Midianites. By ruse and surprise, Gideon threw the Midianites into panic, whereby, they fought amongst themselves in the dark. It was during the ensuing rout and brilliant pursuit that the Israelites slew most of the foe. Other records show that night combat was utilized by Ghengis Khan and his successors until the middle ages when, paradoxically, it fell into disrepute as it was considered poor sportsmanship to attack at night.

In 1904-05, the Japanese Army was fighting superior Russian forces. To the rest of the world it appeared to be only a question of time until the Japanese forces would be bowled over by the Russians. During this war, which they won in a surprisingly short time, the Japanese made several extremely successful large scale night attacks against the Russians. Few military observers grasped the significance of this mode of attack. The Japanese continued to study night movements and evolved painstaking methods to improve night vision. Consequently, when World War II started they had developed a technique for combat at night. Our nation ran into this technique at the beginning of the war in the Pacific. Hushed stories asserted that the Japanese could see as well at night as in the daytime. The myth of the invincibility of the Japanese as night fighters was born. This myth was shattered when the Americans began to apply the knowledge gained from the research instigated by Training Circular 44 and developed a technique of night combat.

PHYSICAL ASPECTS OF NIGHT VISION

To develop a more thorough understanding of the technique of night vision, it is necessary to first acquire a basic knowledge of the physical construction of the eye.

The eye is composed primarily of four parts; the pupil, the lens, the iris and the retina; our chief concern is the retina and the effect of various levels of illumination upon it.

The retina, in general, is hemispherical. Its concave surface is composed of two types of receptors, designated because of their shape as rod cells and cone cells. There are about 130,000,000 rod cells in the retina and about 7,000,000 cone cells. The cone cells are responsible for daylight vision and the recognition of fine detail and color. These cells are located in the fovea centralis, a small region in the retina where the most critical focus is obtained. (See figure 76)

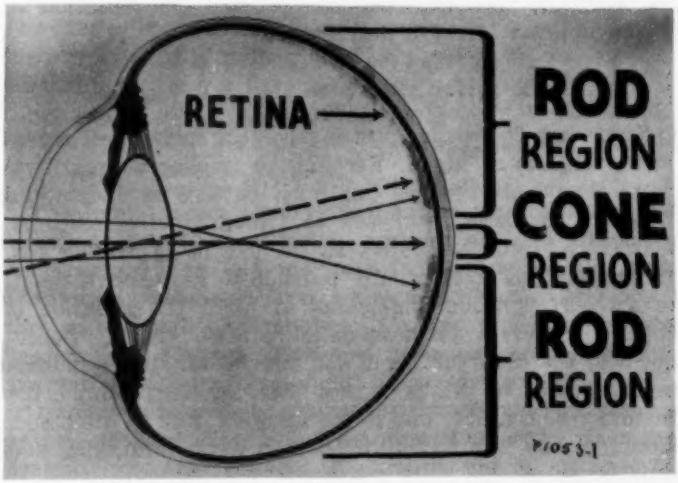


FIGURE 76.—Rod cells located in the parafoveal region of the eye make vision possible under conditions of low level illumination.

Surrounding the fovea centralis, which is composed almost entirely of cone cells, is the parafoveal region of the retina. This area is predominantly composed of rod cells. These receptors function only at lower levels of illumination and under such conditions that neither fine detail nor color may be discriminated by them. This factor causes

a fuzzy edge to be seen on all objects at night and eliminates all color except shades of gray or black. (The old adage, "All cats look gray at night," is derived from this fact.) In the external segments of the rod cells, there is a red pigment known as *visual purple.* When light waves of low intensity fall on the rod cells, a photochemical change takes place which stimulates the formation of visual purple. (Visual purple is an unstable substance readily decomposed or altered by the mechanical effect of light waves.) When the visual purple is exposed to light it bleaches, consequently producing an image, which in turn gives rise to nerve impulses that are transmitted to the brain, thus producing the sensation of vision. In summarizing, it may be stated that the cone cells are used in seeing objects in the daytime and that the rod cells provide the sensation of vision in lower levels of illumination.

FOUR PRINCIPLES OF NIGHT VISION

There are four principles involved in *seeing* and *recognizing* objects at night. Recognition implies a great deal more than mere seeing. One must be able to understand what he sees, and, from one or two distinctive features, identify a particular object as the one he is looking for. In the daytime it is usually possible to see enough detail to make recognition simple but at night the situation is entirely different for less detail will be visible. Consequently, the observer must not miss a detail or underestimate what he thinks he sees. Bearing this in mind, the factors which enable one to see at night will be discussed, namely; dark adaptation, off-center vision, scanning, and confidence.

Dark adaptation. To ilustrate this phenomenon, recall your reactions to the sunlight as you come out of the theater in the afternoon. How, at first, light seems to glare blindingly, but in a moment or so, light conditions appear normal. Conversely, upon going into the theater from normal daylight, the interior seems to be very dark and without the aid of the usher's flashlight, it is difficult to determine which seats are empty. However, after a few moments of

total blackness, the eyes become accustomed to the darkness and it is possible to distinguish people and objects.

In the process of adapting the eyes to darkness, several changes take place. The parafoveal region of the retina must become dark adapted. This is a process of conditioning the rod cells, or the night eyes, of the retina, to function at low levels of illumination. While dark adaptation is a comparatively slow process, it is found that the progress is rapid in the initial stages. In the first 15 minutes the eyes will usually become about 80 percent dark adapted; then the process slows down considerably until the eyes become about 98 percent dark adapted at the end of 30 minutes. In the first 15 minutes, when progress is rapid, there are several functions taking place at the same time. The cone cells are going blind by ceasing to function, due to the low level of illumination. The pupil is expanding and admitting as much illumination as possible. The final function is that of the chemical synthesis of *visual purple* by the rod cells. This process is somewhat more complicated and requires more time.

The total process of dark adaptation requires approximately thirty minutes for a normal person. Excessive drinking, smoking and the use of drugs retard the dark adaptation processes. Eyes which have become weakened through use will also require a greater length of time to become dark adapted. The most serious retardant to dark adaptation is light; complete light adaptation of dark adapted eyes takes only a very few minutes as they become 98 percent light adapted in 3 minutes. Therefore, when the eyes are once dark adapted, they must not be exposed to illumination.

The eyes can be dark adapted during hours of daylight by wearing specially designed red goggles. The rod cells react to red light in much the same manner as they do to darkness. Consequently, if red goggles or red lights are used, the rod cells will become dark adapted while one is reading or performing other duties that require the use of

the eyes. After thirty minutes of this synthetic night, the eyes will be 98 percent dark adapted.[1]

Off-center vision. The methods of seeing at night and in the day time are entirely different. When seeing in the daytime, one looks directly at the object in order to see it and the objects around it clearly and sharply; however, in a short time objects on the flanks appear to fade, become blurred, and lose their color. On the other hand, to see an object at night, it is necessary to look to one side, above, or below the object. It is not necessary, of course, to look too far to the side, 6 to 8 degrees will suffice, but attention must be focused on the object to be viewed. When looking off to one side, the image enters the eye at an angle, is transcribed in the rod cell region of the eye and is converted into sight by the brain. Off-center vision requires continuous effort, but, with practice, the knack will be attained. If only one section of the rod cell region of the eye is used in viewing an object at night, it will fade completely away and a black spot will appear where the vision is focused. This phenomenon results from the fact that the chemical visual purple produced by the rod cells is rapidly used up in the process of seeing at night, and unless new rod cells are employed, temporary blindness is caused by the failure of the tired rod cells to produce visual purple.

Scanning. In scanning, the eyes are moved in short, choppy, abrupt movements over and around the object being viewed. To see, one must move the image on the retina to new rod cells. Therefore, to see an object, it is necessary to scan the object continually. To illustrate this principle more clearly, visualize the face of a clock. Assuming the object you desire to see is at the center of the clock, it is necessary to look off-center—out into the region of the

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[1]An interesting story on dark adaptation concerns the Gurkhas, British Colonial Troops from Nepal in Northern India. These troops were greatly feared by the Germans in the past war as night fighters. To the Germans they were agents of the devil and a breed blessed with the vision of a night owl. Strange to relate, these fighters prior to a night mission participated in a religious ceremony in which they were kept blindfolded for thirty minutes. The blindfolds were not taken off until the men were led away from any artificial light. Thus, by some freak of nature, these people arrived at a scientific conclusion of the process of dark adaptation without knowledge of science.

numerals. You scan by looking at 12 o'clock with attention concentrated on the center of the clock, then down to six o'clock, then at three, over to nine, etc. This jerky movement transfers the image from used rod cells to rested rod cells.

Confidence. The eyes are used almost completely in very strong light. The brain is adjusted to a vivid image of sharpness and brilliant color. In darkness, one gets an image of little contrast and no color. The brain is not trained to recognize it. When a person "guesses" that he sees an object at night, the mathematical odds are high that he actually does see it. By being aware of this fact, and by practice, the individual will soon build confidence in his ability to see at night and will see objects that were heretofore invisible to him.

TESTING PROCEDURES

In order to avoid fatal experiences like the one illustrated at the beginning of this article, the Army, under provisions of TC 44, conducted studies of night vision. A Night Vision Testing Laboratory was established at Fort Knox, and, soon thereafter, at Fort Knox, Fort Sill, and Camp Blanding, hundreds of soldiers were given night vision tests. From these studies and tests, methods of measuring a man's natural ability to see at night, and of augmenting this natural ability through training, were established. It was also proven that there is no difference in the inherent ability to see at night, between races of people, or between country-bred and city-bred people. (A difference of opinion regarding this statement may exist because of the presumed ability of the jungle native to see at night better than white men. The jungle native unconsciously knows how to use his eyes in the dark, because, when darkness falls and there are no artificial aids to seeing, he either adjusts his eyes to the dark or does not move. With civilized people this fact does not hold true, as we merely turn on the lights when it becomes too dark to see with ease.)

The tests have also revealed cases in which a man who can see perfectly well in the daylight, becomes literally blind at night. This is entirely possible, for the parafoveal

region of the eye could possibly have been destroyed by either an injury or a disease of the eye. Less than one percent of all men tested, however, were found to have this defect.

While considering the factors of man's natural ability to see at night and methods of properly using the eyes in night vision, it is necessary to mention several additional aids that are helpful in night vision training. Auto-kinetic illusion is the phenomenon that one experiences when a fixed point of light appears to wander or move at night; it results from fatigue of the eye muscles due to staring. This phenomenon may account for "trigger happiness" and excessive firing at night by green troops. A further understanding of auto-kinetic illusion may result in the elimination of the dangers involved.

It is now a well-known fact that lack of certain vitamins such as A and B1 will retard the process of dark adaptation. However, after acquiring the amount needed, an excess is of no further value.

FIGURE 77.—Army Night Vision Tester.

The only practicable means of finding out how well men see at night is by tests. Try-outs during combat are too wasteful of time, facilities, and lives. Therefore the Army developed the Army Night Vision Tester (ANVT) by which men can be classified into five grades with respect to their ability to see at night. The men with superior night

vision are placed in Grade I; men whose night vision cannot be relied upon are placed in Grade V; the others range in between.

In using the Night Vision Tester, two points must be taken into consideration:

(1) The night vision test must be given in the same manner to each man of every group tested.

(2) The tester, itself, must be in standard adjustment and the test must be given according to a standard procedure. In failing to comply with these rules, the test becomes a failure and the time is wasted.

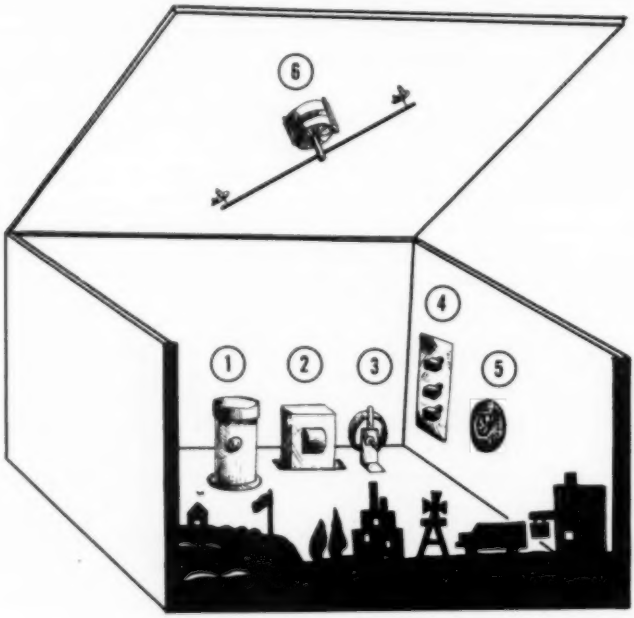
The Army has authorized use of the Night Vision Tester because it has high reliability and validity. This equipment measures night seeing ability under controlled conditions accurately and it measures each man equally well. Of course, the reliability of the ANVT depends upon the skill and discipline of the team responsible for the tester and the administration of the test. The instrument must operate consistently, time after time. The scoring must be the same for every man. Therefore, the construction and operation of the Night Vision Tester must follow prescribed procedures without deviation.

TRAINING PROCEDURES

When the men have been graded by the Army Night Vision Tester and have been placed in the different grades in which they fall, (I, II, III, IV or V), night vision training must be inaugurated. It is imperative that night vision be augmented through the special training techniques which have been developed. *Tests that have been given prove conclusivesly that men can, and do, improve one or more grades after practicing and undergoing training in night vision.*

To facilitate this indoor training, the Shadowgraph, which is an inexpensive aid, may be employed. In order to illustrate dark adaptation and to practice off-center vision, scanning, and resting the eyes, an adaptation of the Shadowgraph has been designed for use in training troops. This apparatus can be constructed of available material in

accordance with the illustration in figure 78. The Shadowgraph is constructed with a silhouette cut from heavy paper in such a manner that when a light is produced behind it, a shadow is cast on the screen in front of the box. The box also contains a transformer for converting the 110-volt current to 6-volt current for the light. A light source is provided by placing a 6-volt bulb in a lightproof container, emitting only enough light to produce a light comparable to the brilliancy of dim starlight. The rheostat increases or decreases the light intensity for subsequent training. On



(1) LIGHT SOURCE
(2) TRANSFORMER
(3) RHEOSTAT
(4) CONTROL PANEL
(5) 110 VOLT SOCKET
(6) 110 VOLT CLOCK MOTOR

FIGURE 78.—A shadowgraph similar to the one shown above can be constructed from salvage equipment.

the lid of the box, an electric clock motor is attached, which applies motive power for the airplane which casts a moving shadow on the wall or screen.

When using the Shadowgraph, a blacked-out room is required, as the illumination provided by the apparatus is adjusted below the light level of the cone cells. Twenty to twenty-five men may be trained simultaneously with only one Shadowgraph.

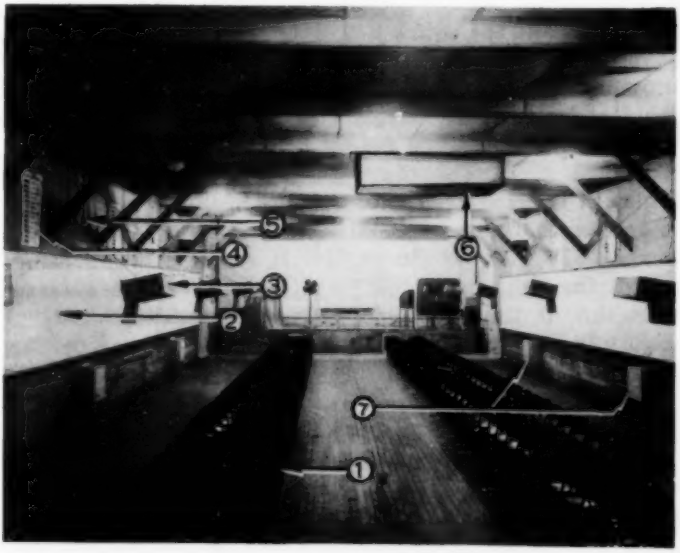


FIGURE 79.—Lightproof classroom for night vision training.

(1) Chair arrangement
(2) Paper screen
(3) Shadowgraph
(4) Color spectrum chart
(5) Red lights
(6) Ceiling fan (essential)
(7) Ventilators (essential)

The screen upon which the shadow is cast, must be either a solid white wall or a white sheet, or cloth, about twenty feet long and five feet high. The Shadowgraph is centered on the screen and placed nine feet from the screen. Two rows of seats are placed directly beneath the Shadowgraph. In conducting training with the apparatus, the students

must be thoroughly light adapted. The lights of the room are then turned out and the lights of the Shadowgraph are turned on. After a period of from five to seven minutes the screen should be seen by members of the group, and as training progresses, the shadow pictures will be more and more easily recognized. During the thirty minutes in which the individuals slowly become dark adapted, the instructor should periodically advise the groups of the length of time which has passed. At the end of thirty minutes, all objects in the shadow picture cast on the wall should be recognized and the entire silhouette be clearly visible. It is advisable to change the silhouette picture occasionally, thus providing new material for the men to view and insuring constant interest. The airplane casts a shadow as it passes by the screen, but when followed by the eye, it appears to fade from view. This illustrates the blind spot caused by failure of the cone cells to function. This device also serves to develop confidence, for, at first, all men will not see this shadow. To improve the night vision of the group being tested, the light inside the Shadowgraph can be lowered from time to time, to depict different intensities of light. Figure 79 illustrates a method of arranging a class room for night vision training utilizing a series of Shadowgraphs and other training aids.

To get the greatest response from the men, they must be encouraged to speak out whenever they recognize an object on the shadow screen. This encourages participation by the whole group.

Although indoor training is effective, particularly in the early stages, it is necessary to complete the night vision training program under natural conditions. A man gains nothing from this training if he uses his eyes at night in the same manner as in the daytime. He must be reminded constantly to use off-center vision and to scan the field.

An outdoor training course must be located on varied terrain with sufficient open spaces, woods, and vegetation to provide varying degrees of darkness, obstacles, silhouettes, and background. The location of the outdoor course should be far enough from camps, towns, or other illuminated areas so that reflected light will not be visible.

The course is laid out in an area upon which certain military objects are located; tape, luminous markers, or lime can be used for guide lines. At each station an arrow is erected pointing toward the target. The individual being trained follows the course from one station to another. When he approaches a station, he is told that there is an object a certain distance from him and is required to identify it.

In all this training, the general rules affecting an individual's ability to see at night must be stressed:

1. Dark adapt the eyes for thirty minutes and keep them dark adapted. Make use of red light discipline.
2. Learn to look off center.
3. Develop a scanning routine—scan in short, choppy, abrupt movements.
4. Use the mind and the eyes as a team and concentrate the attention on seeing and recognizing objects. This will develop confidence.

PART II

INFRARED EQUIPMENT

The use of infrared radiation in military operations is based on the invention of special devices which permit the individual to see the otherwise invisible infrared rays. The human eye is sensitive to white light, which includes all the colors which can be seen by directing a beam of light through a prism. Sunlight, tungsten, and carbon arc lamps are all composed of a range of pure color. Flanking this white light, on the color spectrum are many forms of radiation, such as cosmic rays, x-rays, heat, and radio waves. Nearest to visible light at opposite ends of the spectrum are the ultraviolet ray and the infrared ray. Scientists reasoned that since infrared rays are so close to the visible light of the spectrum, that they might have some of the same physical characteristics as white light. Research in this field indicates that they differ from white light only in that they cannot be seen by the unaided eye; infrared radiation is like white light in that it can be controlled by

reflectors and glass lenses and is diffused in the same manner as white light. Consequently, it suffers a loss of intensity as it passes through clouds, fog, dust, rain, or snow. Also, infrared radiation is reflected from the surface it strikes, as is white light.

Due to the necessary time lag between research and development, it was not until the closing phase of World War II that infrared equipment suitable for use by the Ground Forces was produced by manufacturers. As soon as the first infrared equipment came off the assembly lines, however, it was flown to Okinawa by couriers. General Buckner, then Commanding General of the Xth Army, said, "the ones I received were worth their weight in gold." As might be expected, all men felt much more secure at night when they knew that some men on the perimeters were armd with "Buck Rogers" gadgets that enabled them to see at night without being seen. With this knowledge, friendly troops were afforded a sense of security which bolstered their morale and gave them an opportunity to gain much needed rest.

The following paragraphs briefly explain the capabilities and uses of the infrared equipment now available to the Ground Forces. Continued scientific research will undoubtedly determine other uses for the equipment and provide information leading to design of more advanced equipment.

The Metascope US/F (figure 80) is designed to receive infrared rays and convert them into a visible light. The instrument is sensitive enough to react to direct rays from infrared light sources and under very favorable conditions, will react to reflected infrared radiation. It is designed for detecting direct infrared light sources, such as the M1 Airborne Beacon, the lamp of the Sniperscope, and use of infrared equipment by the enemy. The Metascope US/F consists of a 3-inch cubicle, metal case fitted with lenses, mirrors, prisms, and special compounds for converting invisible light into visible light. As it weighs only about one pound, it is easily carried in the pocket or around the neck. When receiving the direct rays, the maximum range

of the Metascope is 500 yards from a flashlight with infrared filter; two miles from an M1 Airborne Beacon; and three miles from the lamp of a Sniperscope.

FIGURE 80.—Metascope, type US/F.

The Airborne Beacon M1 is a device mounted on a 24-foot mast which sends out a *directional* beam of infrared light. The power is supplied to an automatic coding flashimeter and an incandescent lamp by a dry-cell battery. The beacon is constructed so that it will automatically send repeated flashes representing the dots and dashes of a selected, single letter of the alphabet. A spring-return toggle switch permits manual operation of the beacon if the automatic coder fails to function. It is not used as a signaling device, however, because the incandescent lamp does not light instantly. A specially prepared filter built into the beacon head eliminates practically all of the visible light from the incandescent lamp and allows the infrared light to pass through. The lens of the beacon is constructed to allow rays to go out in a 360° conical band, having a 15° vertical arc. The instrument has an operational range of two miles when viewed through a Metascope US/F, or three and one-half miles when viewed by the electronic telescope of a Sniperscope. It weighs 42 pounds and is used mainly as a homing device by paratroopers. Maintenance of this equipment consists of frequent inspections, cleaning, servicing, recharging the battery, and replacement of broken parts. Several adaptations of the Airborne Beacon have been designed with increased advantages.

The Sniperscope (figure 81) is a more complicated piece of equipment than either the M1 Airborne Beacon or the Metascope, and is discussed in greater detail. It consists of four main items: the lamp, the electronic telescope 230, the power pack, and a 6-volt battery.

Several types of electronic tubes have been developed which are sensitive to light. By proper selection of the materials in the electrodes, it is possible to make a photo cell that is sensitive to infrared radiation. Further developments produced a photo electric tube that can produce an *image* of the object at which it is directed. By adding a series of glass lenses to the photo tube a telescope was designed in which infrared rays are picked up at one end and produced as a visible image at the other end.

In order to project an invisible ray for illuminating an area, or for signaling, a light source is needed. As it is known that all incandescent light gives off some degree of infrared light, the problem was to devise a means of stopping the visible rays and permitting the invisible rays to escape. To eliminate the visible light, a specially prepared filter is attached to heat resistant glass, which absorbs visible light. A 6-volt sulphuric acid storage battery was designed to provide the necessary power supply for this unit.

FIGURE 81.—The sniperscope.

The power pack, an airtight, waterproof, metal container, consists of a transformer, vibrator, and rectifier tube. This unit is designed to convert the 6-volt DC output of the battery to 4250-volts DC needed for operation of the Sniperscope.

The Sniperscope functions in the following manner: The lamp projects an invisible beam of light which floods a given area. The objects that are in this area will reflect part of this radiation, which, in turn, is picked up by the objective lens of the telescope. The rays are then focused on the image-viewing tube (photo tube), where the reflected rays, striking the tube, cause electrons to be released in direct proportion to the intensity of the rays. The released electrons, being of a negative quality, are attracted to the positive plates in the tube. The positive potentials of these plates range from 20-volts on the front plates of the photo tube to 4250-volts on the rear plates. Consequently, the electrons, in accelerating back through the tube, bombard

a fluorescent screen and produce a visible pattern corresponding to the invisible image on the front screen. The objects all appear in various shades of green, regardless of their actual color. The eye-piece lens on the rear of the telescope magnifies the image until it is recognizable.

The maximum effective firing range of the Sniperscope as it is now designed is about 100 yards. By careful focusing and by using cross-illumination, this range may be increased. By using a more powerful light source, the maximum range of the Sniperscope could be increased to exceed the effective firing range of the carbine.

The Snooperscope (figure 82), a modification of the Sniperscope, is designed primarily for communication and observation. It differs from the Sniperscope in that it is mounted on a plastic, hand-held mount.

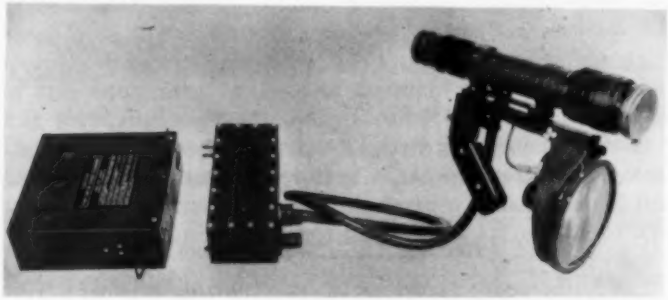


FIGURE 82.—The snooperscope.

SUMMARY

A clear, dark night affords the best conditions for use of infrared equipment; however, the use of this equipment is practicable and often valuable under unfavorable light such as moonlight, dawn, and twilight. Under these conditions the optical system has a hazy glow which tends to reduce the sharpness of detail in the objects being viewed, but still allows the operator to see and recognize objects that would otherwise be invisible.

In the present stage of development infrared equipment is primarily used for defensive and security missions since the weight and bulk of the equipment, except the metascope, limits its use under fire or in a fast moving situation. However, the equipment does have many valuable uses in the attack. It is ideal for use by both combat and reconnaissance patrols on short range missions. It can be used to guide units in the approach march, and even in the assault on strong points. It can be used to indicate assembly points, for night signalling, to mark gaps in mine-fields, etc. The sniperscope, by firing tracers or by placing illumination on the target, can designate targets for other weapons.

It is apparent that there are innumerable possibilities for the use of infrared equipment. The degree of success attained in using this equipment, however, depends on the ingenuity and skill of the commander and operator.

CHAPTER 13

Infantry Weapons

Military weapons have but little practical value in peacetime. Even military small arms have only a limited adaptability for such peacetime pursuits as game hunting or even target shooting. Obviously the more elaborate weapons such as mortars, towed guns, and vehicular mounted guns have absolutely no practical value other than as instruments of destruction. For this reason the production of military weapons necessarily lags far behind their development on the drafting boards.

Consequently, the most outstanding development of weapons takes place while the nation is confronted with the threat of war or is actually engaged in war. The reasons are obvious: (1) Unlimited economic and technological resources are directed toward a common goal of producing more effective instruments of destruction. (2) Weapons are developed for a specific purpose such as to counter-effect enemy weapons, equipment, or tactics.

In order to adequately evaluate the improvements that have been effected in infantry weapons during the last few years it is necessary to realize that it has taken over 500 years to develop small arms to their present state. This period of evolution breaks down roughly into three phases. *The first phase,* from sometime in the first quarter of the fourteenth century to approximately 1515, can be called the slow match or fire stick period, in that all arms ignition was dependent on a slow burning match that had to be carried lighted at all times and applied to a touchhole on top, or a flash pan on the side in later models, to discharge the weapon.

The second phase, covers the years 1515 to 1807 and can be termed the flint and steel period. During this time various spring actuated devices made of flint and steel were used

to produce sparks to ignite the priming powder in the flash pan which in turn touched off the main charge in the chamber. Means for effecting this type of discharge improved during the period, thus making the flint lock surer of fire, simpler, and more convenient to use than its predecessor, the wheel lock.

Early in the sixteenth century, another improvement appeared which was destined to be one of the most far-reaching ever embodied in firearms—the introduction of rifling. It is believed these grooves or riflings were first employed to provide a space where residue might collect thus permitting discharge of a greater number of rounds before cleaning became necessary. However, it was soon discovered that the spiral grooves caused rotation which imparted stability to the flight of the ball, greater accuracy, and increased range.

The third phase, stretching from about the year 1807 to the present day, covers the percussion powder and cap period. As a result of earlier French experiments, a Scotch clergyman, Alexander Forsyth, developed and patented an application of fulminate of mercury to discharge a firearm. Forsyth's use of two compounds which would detonate on being crushed between metals, made obsolete the century old necessity for the employment of some form of black priming powder in order to insure the ignition of the main charge.

As a result of the improvement of the percussion cap, corresponding alterations and improvements were made in the guns. The reinvention of the breech loader with a metal hammer was soon followed by the needlegun, a crude ball action weapon with imperfect closing action as a paper cartridge was used. In 1866 the British Army adopted a remodeled Enfield rifle and five years later adopted the Martini, a falling block rifle. At the same time the Mauser bolt action rifle was made the arm of the German Army. This rifle is the type of military weapon prevalent during World War I.

During this period, ammunition also underwent radical improvement. The round bullet was replaced by one cylindrical in shape and the cartridge case of paper gave way to

one of coiled brass, then of drawn brass. This made the escape of gas impossible and solved the problems which had so long vexed inventors. The magazine feed principle gradually came into use, first in the form of a tube and then as a box located under the action. With the invention of the copper jacketed, nonstripping bullet and a reduction of the caliber to .3 inch or less, higher velocities were attained. Soon afterward, smokeless or nitro power was introduced and the military rifle assumed practically all the features present in the early twentieth century.

DEVELOPMENT DURING THE WAR

During the last few years all of the technological skill and industral resources of the United States were concentrated on the single objective of producing equipment to win the war. Consequently, practically every piece of equipment utilized by the armed forces underwent a series of developments and modifications. As weapons are the basic equipment of an army they were subjected to the most thorough modernization. In the case of Infantry, each organic weapon was either modified or replaced by a more efficient model during the progress of the national emergency. When existing weapons proved to be inadequate, new ones were developed to accomplish a particular mission. Rocket launchers, recoilless rifles, and carbines are examples of infantry weapons developed from the drafting board stage to the field use stage during the progress of the war.

The system of designating items of ordnance provides a clue as to the amount of research and development that lies behind each approved model of a particular weapon. Depending on their stage of development, items are designated by letters and numbers. Thus "E" means that the weapon is an experimental model; "T", the next higher level, means that the weapon is in the test stage; "M" denotes that the weapon has been adopted for use. The letter "A" used in conjunction with the "M", means that modifications have been made on the adopted model.

For example: E20—denotes twentieth experimental model.

T20E2—denotes second experimental model of the twentieth test type.

M1A1—denotes the first modification of the first adopted model.

Illustrated on the following pages are the weapons utilized for training the Infantry prior to World War II and the war-developed counterpart of each of these weapons. It will be noted that in most cases, the weapons used for training up to 1941, and for combat in the early phases of World War II, are much the same as utilized in World War I.

AUTOMATIC PISTOLS, CALIBER .45

FIGURE 83.—Automatic Pistol, Caliber .45, M1911.

FIGURE 84.—Automatic Pistol, Caliber .45 M1911A1

DATA

(Same for both weapons illustrated)

Weight in firing position	lbs	2.4
Method of operation	short recoil, semiautomatic	
Type of feed	magazine, 7 rds	
Maximum rate of fire	rds per min	21-28
Sustained rate of fire	rds per min	10
Maximum range	yds	1600
Maximum effective range	yds	50
Muzzle velocity	fs	810

The M1911A1 pistol is a modification of the M1911 model. The operation of both pistols is exactly the same, with improvements consisting of five external changes:

(1) The tang of the grip safety is extended to protect the hand.

(2) A clearance cut is made on the receiver for the trigger finger.

(3) The face of the trigger is cut back and knurled.
(4) The main spring housing is raised in the form of a curve to fit the palm of the hand and is knurled.
(5) The top of the front sight is widened to permit faster aiming.

UNITED STATES CARBINES, CAL .30

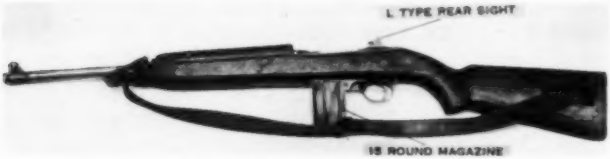


FIGURE 85.—United States Carbine, Caliber .30, M1.

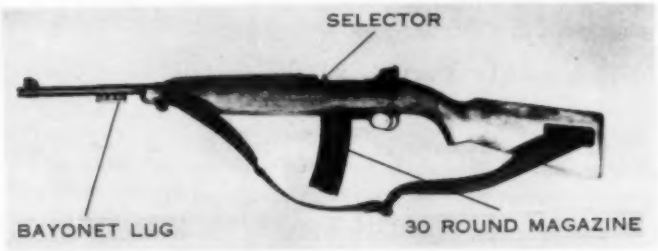


FIGURE 86.—United States Carbine, Caliber .30, M2.

DATA	CARBINE CAL. 30 M1	CARBINE CAL. 30 M2
Weight in firing position.....lbs	5.75	6
Method of operation	Gas operated, semi-automatic	Gas operated, semi and full automatic
Type of feed	Magazine, box type, 15 rds	Magazine, box type, 30 rds
Cyclic rate of fire.....rds per min	——	750-800
Sustained rate of fire.....rds per min	40-60	40-60
Maximum range .....yds	2000	2000
Maximum effective range .....yds	300	300
Muzzle velocity .....fs	2000	2000

The United States carbine, caliber .30 is designed to fill the gap between the pistol and the M1 rifle. It is a weapon that is lighter than the M1 and is effective at greater ranges than the pistol. The breech machanism in reduced size is almost identical with the M1 rifle. The carbine, M2, represents a modification of the carbine, M1, in that it can deliver full automatic as well as semiautomatic fire. This is accomplished by means of a selector on the left side of the receiver. A 30-round, staggered box magazine replaced the 15-round M1 type. An extension with a bayonet lug has been added to the front band to seat the bayonet knife, M4. With the exception of the full automatic fire mechanism and the bayonet stud, the United States carbine M2 is unchanged in appearance and design.

Also to be noted is the development of the grenade launcher M8, which permits hand or rifle grenades to be projected from the carbine.

UNITED STATES RIFLES, CALIBER .30

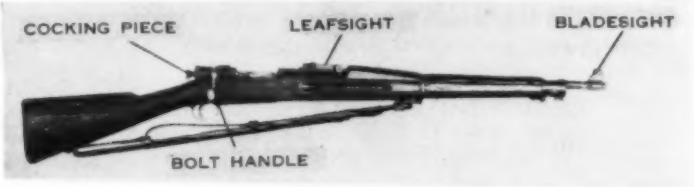


FIGURE 87.—United States Rifle, Caliber .30, M1903.

FIGURE 88.—United States Rifle, Caliber .30, M1.

DATA	U.S. RIFLE CAL. 30, M1903	U.S. RIFLE CAL. 30, M1
Weight in firing position.....lbs	8.69	10.3
Method of operation	Manual, bolt action	Gas operated, semi-automatic
Type of feed	Clip, rds 5	Clip, rds 8
Maximum rate of fire.....rds per min	15	16-32
Sustained rate of fire.....rds per min	8-10	15
Maximum range .....yds	3500	3500
Maximum effective range .....yds	600	500
Muzzle velocity .....fs	2700	2800

The United States rifle, caliber .30, M1, the finest military rifle in the world, is capable of producing two or three times as many aimed shots as the United States rifle, caliber .30, 1903, which it replaced. The most important characteristic to note is the evolution from manual operation in the '03 rifle to semiautomatic operation in the M1.

Also to be noted is the development of a grenade launcher M7, for the M1, which is capable of projecting both hand and rifle grenades.

BROWNING AUTOMATIC RIFLES

DATA	BAR CAL. 30 M1918	BAR CAL. 30 M1918A2
Weight in firing position, (approximately) ..... lbs	16	21
Method of operation	Gas operated, full and semi-automatic	Gas operated, automatic, two-cyclic rates
Type of feed	Magazine, 20 rds	Magazine 20 rds
Cyclic rate of fire.....rds per min	500	350 slow 500 normal
Sustained rate of fire.....rds	40	40-60
Maximum range .....yds	3500-5500	3500-5500
Maximum effective range .....yds	600	500
Muzzle velocity .....fs	2680	2800

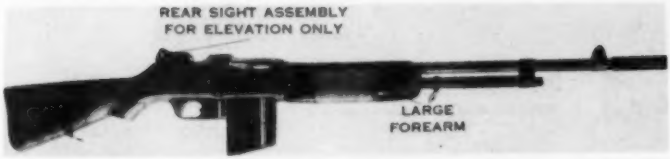


FIGURE 89.—Browning Automatic Rifle, Caliber .30, M1918.

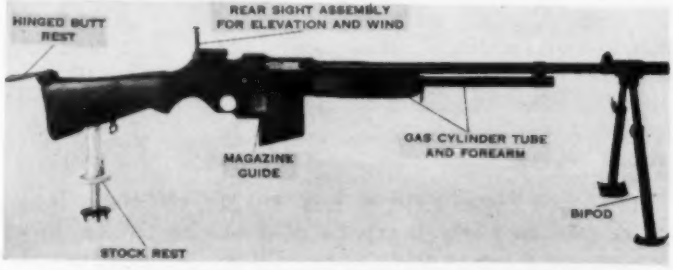


FIGURE 90.—Automatic Rifle, Caliber .30, M1918A2.

The United States Browning automatic rifle, M1918, was developed prior to, and used in the later stages of World War I. Since that time, the M1918A2 modification has evolved. The changes over the old M1918 are : addition of a bipod, new rear sight, hinged buttplate, and a stock rest. The BAR, a rough, rugged, basic infantry weapon, has changed surprisingly little for its 27 years service. Its combat record dates from brief battle trials in October 1918 to extensive use in all theaters of World War II.

SUBMACHINE GUNS

FIGURE 91.—Thompson Submachine Gun, Caliber .45, M1A1.

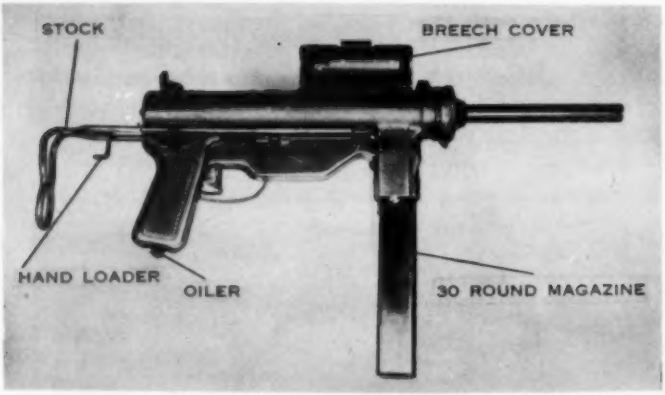


FIGURE 92.—Submachine Gun, Caliber .45, M3A1.

DATA	M1A1	M3A1
Weight in firing position.....lbs	11.5	10.25
Method of operation	Blowback, automatic and semi-automatic	Blowback, full automatic
Type of feed	Magazine, box type 20 or 30 rds	Magazine, box type 30 rds
Cyclic rate of fire.....rds per min	700-800	450
Sustained rate of fire.....rds per min	40-60	40-60
Maximum range .....yds	1700	1700
Maximum effective range.....yds	100	100
Muzzle velocity .....fs	885	900

The submachine gun, caliber .45, M3A1, is a light, compact, rugged war-developed weapon, designed for simplicity and reliability. The entire weapon, with the exception of bolt, barrel, and sear, is stamped out of metal, speeding production and reducing cost. With far fewer moving parts than the Thompson submachine gun, M1A1, the M3A1 will function under conditions that would clog most automatic weapons.

A special feature of the M3A1 is a hinged breech cover which provides added protection for the working mechanism and keeps dirt out of the action. This cover is also a safety

feature as the weapon can not be fired unless the cover is fully opened. Another feature of the submachine gun is a steel rod skeleton stock which slides into tubes on the sides of the frame, making a compact machine pistol or when extended, a shoulder weapon.

LIGHT MACHINE GUNS

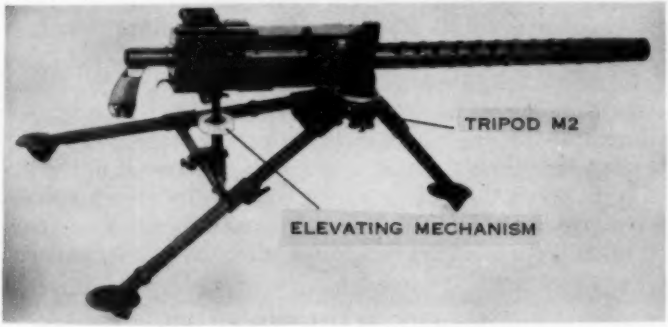


FIGURE 93.—Light Machine Gun, Caliber .30, M1919A4.

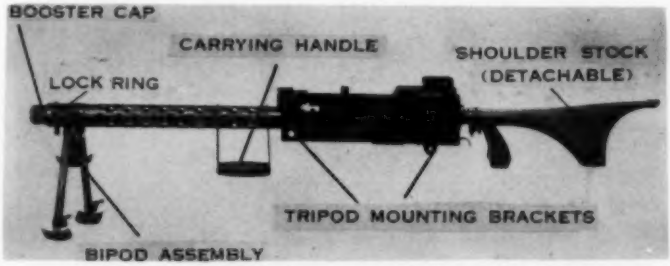


FIGURE 94.—Light Machine Gun, Caliber .30, M1919A6.

DATA	LMG CAL. 30 M1919A4	LMG CAL. 30 M1919A6
Weight in firing position.....lbs	31.00	32.5
Weight of tripod mount, w/pintle and elevating mechanism.....lbs	18.75	——
Method of operation	Recoil, full automatic	Recoil, full automatic
Type of feed	Belt	Belt
Maximum rate of fire.....rds per min	400-550	400-550
Sustained rate of fire.....rds per min	60	60
Maximum range .....yds	3500	3500
Maximum effective range .....yds	2000	2000

The light machine gun, M1919A4 is a modification of the basic Browning recoil-operated machine gun. The M1919-A6, an adaptation of the A4, is shoulder operated and bipod mounted. The M1919A6 machine gun functions in the same manner as the M1919A4, but has in addition, a booster cap to speed up the cyclic rate. This booster cap traps some of the gas as it leaves the barrel, which acts to insure positive recoil action when the gun is fired at angles other than horizontal.

In the M1919A6 version, a bipod is mounted on the muzzle end of the barrel jacket and a removable shoulder stock is fitted over the grip. A carrying handle is attached by rings to the barrel jacket so that it will swing down out of the line of sight when the gun is in use and readily swing upward for carrying the gun. Tripod mounting brackets are attached to the bottom of the receiver so that the gun can be used on a tripod when desired.

HEAVY MACHINE GUNS

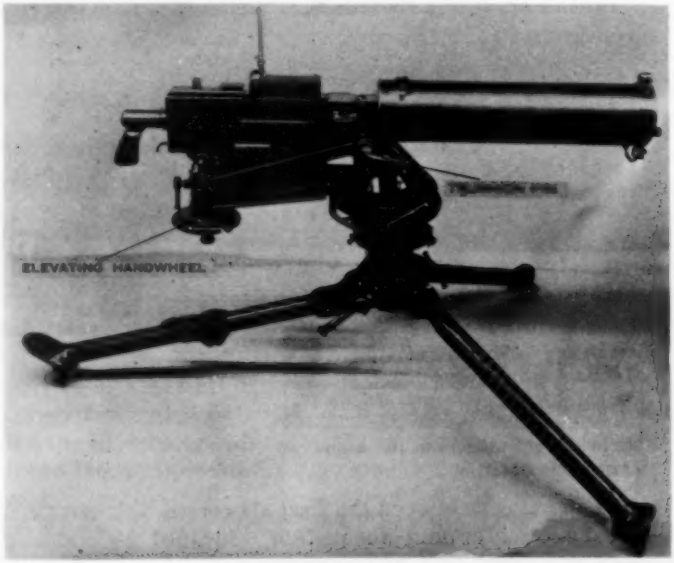


FIGURE 95.—Heavy Machine Gun, Caliber .30, M1917 w/1917 tripod.

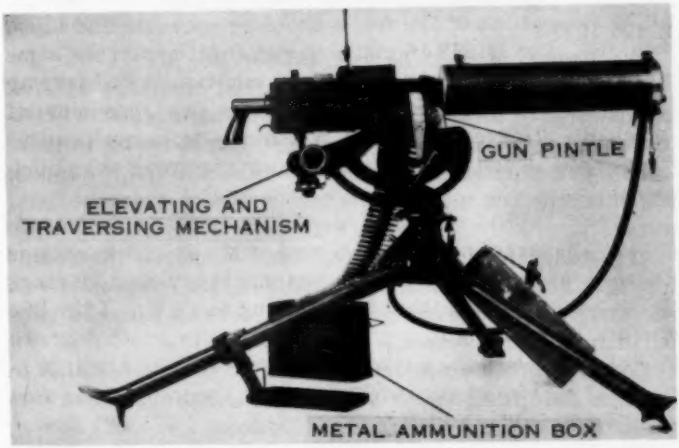


FIGURE 96.—Heavy Machine Gun, Caliber .30, M1917A1 w/1917A1 tripod.

DATA	CAL. 30 M1917	CAL. 30 M1917A1
Weight in firing position.....lbs	86	94.2
Method of operation	Recoil, full automatic	Recoil, full automatic
Type of feed	Belt, fabric 250 rds	Belt, fabric 250 rds
Cyclic rate of fire.....rds per min	400-525	450-600
Sustained rate of fire.....rds per min	125	125
Maximum effective range.....yds	2000	3500*
Maximum effective range (antiaircraft) ..... yds	Not adaptable	700
Muzzle velocity ..... fs	2700	2700

*Variation in range due to improvement of ammunition.

Mr. Browning developed the first air-cooled, belt-fed Colt-Browning machine gun about 1898. In 1901 he obtained patents on a recoil type of automatic gun action designed to be used in a heavy machine gun of the water-cooled type.

During World War I it was adopted by Ordnance, and put into the United States service as "gun, machine, caliber .30, Model 1917."

The Browning machine gun, caliber .30, M1917 was designed to function with the Model 1906 cartridge against normal ground targets. At that time no requirements existed for using ground machine guns against aerial targets.

The principle modifications on the M1917A1 weapon, which is still the standard infantry heavy machine gun, were:

(1) Addition of a traversing hand wheel on the mount for right and left deflection. (On the M1917 model, it was necessary to tap the receiver with the hand to make two-mil changes in deflection.)

(2) A new belt feed lever and mounting was required to increase the lifting power because the ammunition box was taken off brackets and set on the ground.

(3) The rear sight leaf is graduated so that either M1 or M2 ammunition may be fired.

.50 CALIBER MACHINE GUN

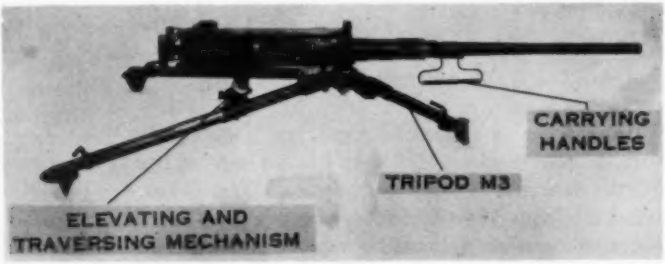


FIGURE 97.—Machine Gun, Caliber .50, HB, M2.

Weight in firing position.....lbs	128 Ground Mount 168 Pedestal Mount
Method of operation	Recoil, semi or full automatic
Type of feed	Belt, metallic link
Cyclic rate of fire.....rds per min	400-600
Sustained rate of fire.....rds per min	75

Maximum range ..... yds	7400
Maximum effective range (anti-aircraft) ..... yds	1000
Armor penetration ..... in @ 100 yds	1.1
Muzzle velocity ..... fs	2935

The machine gun, caliber .50, is based on the original Browing mechanism patented in 1900, but not developed until around 1923. It was designed originally as an antivehicular weapon, but developed into a three-purpose gun: antitank, antiaircraft, or antipersonnel.

The long years of peacetime research and development of the .50 caliber paid off handsomely in the early stages of World War II, as it was the principal arm of American and British fighters and bombers.

There has been little change in the gun from its originally adopted form except for its various mounts. For semiautomatic fire there is a bolt latch on the .50 caliber HB M2 type at the upper rear of the receiver. This securely latches the bolt in the recoil position, keeping a live round clear of the hot chamber. In full automatic fire, the bolt is not latched in recoil position. Instead of the pistol grip of the caliber .30, the caliber .50 has a double spade grip of the Vickers type, which carries a bolt latch release and lock as well as a thumb trigger.

MORTARS

A mortar is a weapon that has a relatively short barrel out of which a projectile is hurled into space in an arched path. Because of its high angle of fire, it can reach targets that are concealed by intervening hills or other barriers.

It is hard to determine when or where the first mortar was used, but it was over a century ago. In 1817 the Army was equipped with 8 and 10-inch mortars as standard equipment; in 1822, our seacoast artillery batteries included 18-inch mortars. In 1915, Sir Frederick Stokes developed the famous Stokes 3-inch mortar and ammunition which was extensively used during World War I. The variations have been numerous; bores have extended in diameter from 50-mm to 940-mm, weight has varied from 19.5 to 173,000 pounds. Projectiles, too, have varied from 2 pounds to 3,650

DATA	60-MM MORTAR M2 W/MOUNT M4	60-MM MORTAR M19 W/BASEPLATE M1	81-MM MORTAR M1 W/MOUNT M4	81-MM MORTAR M21 WITH EXTENSION	4.2 CHEM MORTAR M2
Weight in firing position (lbs)	42	19.96	136	157	333
Method of operation	Drop fired	Drop fired, or trigger	Drop fired	Drop fired, or trigger	Drop fired
Type of feed	Muzzle	Muzzle	Muzzle	Muzzle	Muzzle
Maximum rate of fire (rds per min)	30-35	30-35	30-35	30-35	20
Sustained rate of fire (rds per min)	18	18	18	18	5
Maximum range (yds)	1900	816 low angle 1900 high angle	3290	4400	4400
Minimum range (yds)	200	62	200	200	565
Effective radius of burst (yds)	11	11	25	25	20
Elevation	45°-90°	0-90°	45°-90°	45°-90°	500-5000 mils
Deflection (without moving baseplate)	600 mils	360°	700 mils	360°	300 mils
Type of bore	Smooth	Smooth	Smooth	Smooth	Rifled

pounds, including high explosive smoke, gas, illuminating, and pyrotechnic shells. They have been both breech loaded and muzzle loaded, smooth bored and rifled, however, all have been short barreled in relation to the diameter of the muzzle.

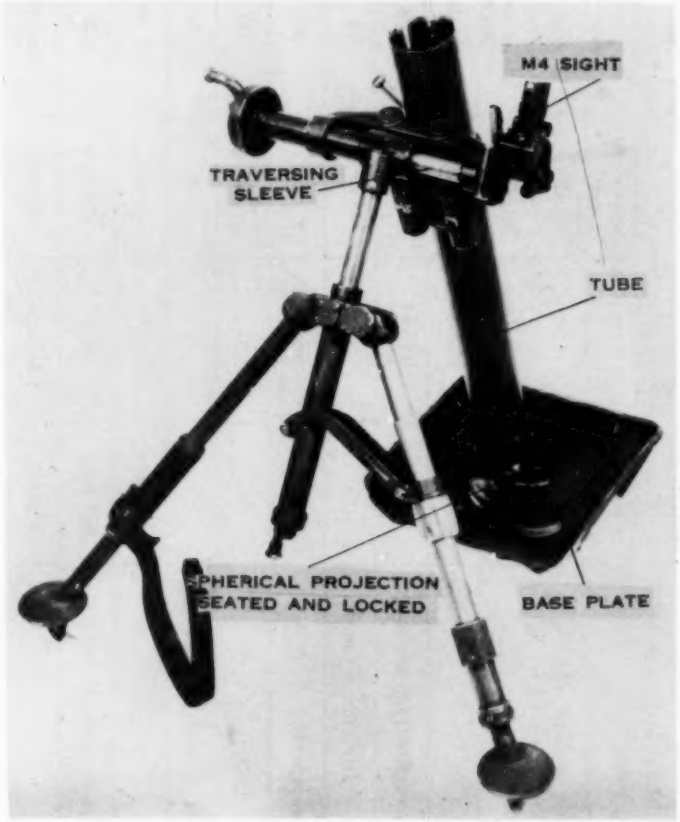


FIGURE 98.—60-mm Mortar, M2.

Patterned after the 81-mm mortar, the 60-mm mortar was developed for use in support of the infantry company and cavalry troop. It is a comparatively light, mobile, and accurate weapon. The new 60-mm mortar, M19 with

M1 baseplate, is a modification of the conventional 60-mm mortar M2. It has a trigger fire mechanism and can be fired either from the standard mount M5 to deliver a high angle fire, or from the M1 baseplate for flat trajectory fire.

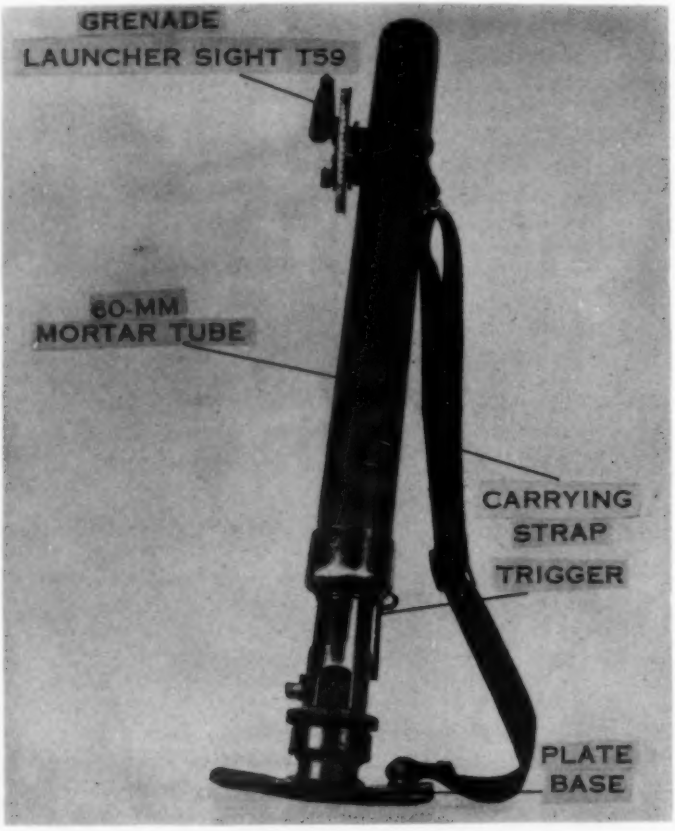


FIGURE 99.—60-mm Mortar, M19.

The latest 81-mm mortar that is to replace the present M1, is designated as M21. This mortar has a circular baseplate that permits 360° traverse without moving the baseplate. It comes in two sections, a ring fitting around the

central group to provide firmer support for firing larger charges. The mortar barrel is broken in three sections each section attached to the other by means of a clamp. This three-section barrel provides for increased ranges. The mortar can either be fired by conventional drop fire or by trigger fire.

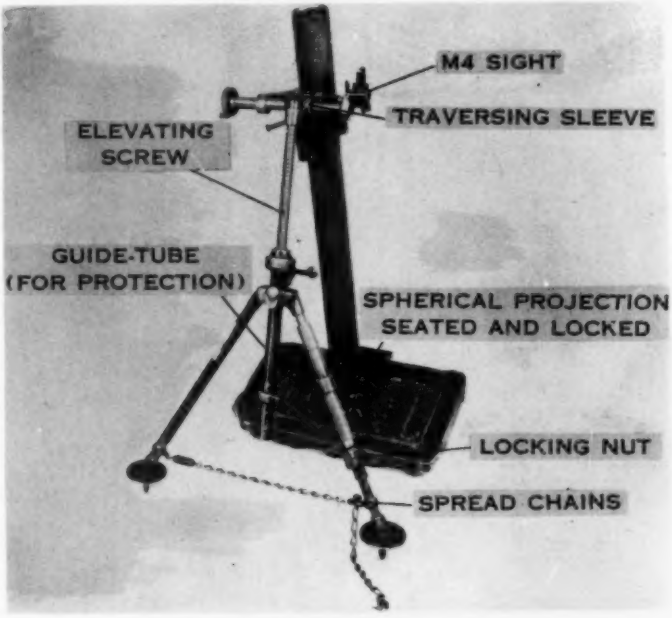


FIGURE 100.—81-mm Mortar, M1.

The 4.2-inch chemical mortar, an adaptation of the 4-inch Stokes mortar, is a rifled, muzzle loading weapon designed for high angle fire at ranges from 565 to 4400 yards. Its 25 pound shell, designed to carry large charges of chemicals, proved to be of great value for firing high explosive ammunition. It is well suited to close support of attacking units as it has a small probable error, (approximately 20 yards in range and 3 yards in deflection at ranges up to 2000

yards). Due to its comparatively heavy construtcion it can only be hand carried for short distances, and is normally transported in carts or ¼-ton trucks and trailers.

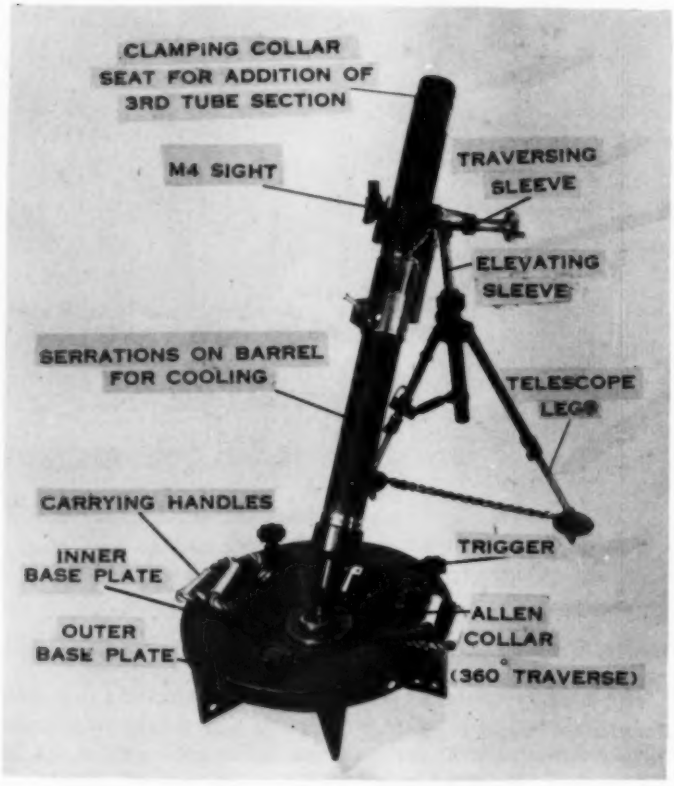


FIGURE 101.—81-mm Mortar, M21.

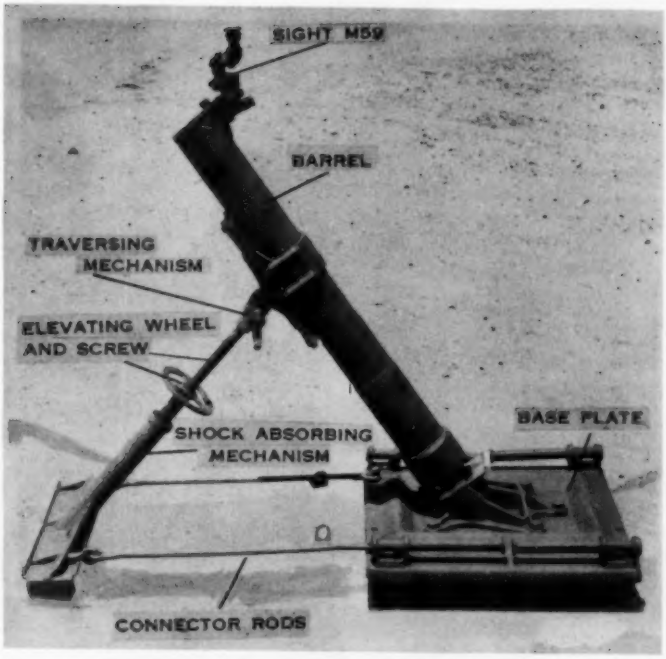


FIGURE 102.—4.2-inch Chemical Mortar, M2.

PORTABLE FLAME THROWERS

DATA	M1	M2-2
Weight in firing position.....lbs	68	68-72
Capacity of fuel tanks.....gal	5 1 void	4 ½ void
Duration of fire.....sec	10	8-9
Range:		
Thickened fuel, in open.....yds	40	40
in undergrowth .....yds	20	20
Liquid fuel, in open .....yds	20	20
in undergrowth .....yds	10	10
Ignition	Spark Plug	Incendiary Charges

FIGURE 103.—Portable Flame Thrower, E1R1.

This weapon was first introduced by the Germans in the winter of 1914-1915, with marked success; later the French followed in its use. While the Americans developed certain models, they were never used in World War I. During World War II, the flame thrower played an important role in both the European and Pacific theaters.

Although the weapon has changed little in appearance, its functioning is greatly advanced because of the improvements in the gun group and simplification in operation.

The earliest model, the M1, had the pressure cylinder valve in a position which was hard, if not impossible, for the gunner to reach. The present model, the M2-2, has the pressure tank valve convenient to the gunner's reach. Other

minor improvements tend to facilitate the operation by one man and make operation simpler and safer.

Igniting the fuel with the gun group of the M1 was accomplished by means of a spark plug which ignited hydrogen contained in a bottle. This method was not satisfactory

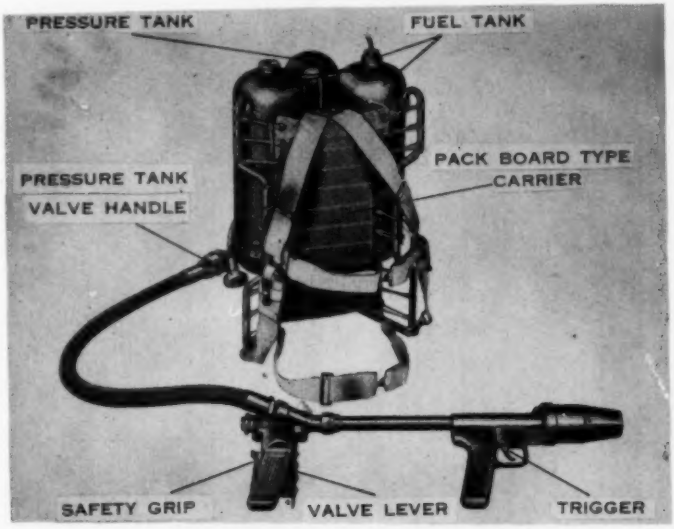


FIGURE 104.—Portable Flame Thrower, M2-2.

under adverse climatic conditions. Ignition in the M2-2 flame thrower, which is accomplished by incendiary charges contained in a water tight container called an ignition cylinder, is 99 per cent effective under all climatic conditions.

Changes in the shape of the carrier have made it less difficult for a man to carry this heavy and bulky piece of equipment.

ROCKET LAUNCHERS

The rocket launcher employs a principle which is as old as explosives. Both Russia and Germany used rocket-type weapons early in World War II. However, the Americans employed the first efficient rocket launcher which could be

DATA	M1	M9A1	M18	3.5-INCH
Weight of launcher	13.26	15.87	10.3	14.35
Overall length of launcher: (a) assembled for firing (in)	54.5	61	61	60.5
(b) assembled for carrying (maximum) (in)	54.5	31.5	31.5	33
Rate of fire per minute (approximate rds)	8	8	8	8
Sustained rate of fire per minute (approximate rds)	3	3	3	3
Type of firing mechanism	Electric			
Internal diameter of tube (in)	2.37	2.37	2.37	3.51
Muzzle velocity (depending on rocket) (fs)	265	265-275 @ 70°		325
Cooling	Air Cooled			
Armor penetration (in)	Rocket M6 4	Rocket M6A5 5	5	11
Effective radius of burst in yards	Rocket M6 11	Rocket WP M10A3 10	10	15
Maximum range in yards	700	700	700	725
Maximum effective range (Area target) (Point target)	700 300	700 300	700 300	700 500
Source of electric current	2 batteries in stock	Magneto contained in hand grip		

carried and operated by a foot soldier. It is an electrically operated, open tube type which can be fired from the standing, kneeling, sitting, or prone position.

The characteristics denoting development since the adoption of the M1 model, other than those listed under characteristics, are open type stock replacing the solid wooden type, the reflecting sight assembly replacing the open bar sight, and reinforcing on the rear portion of the newer launchers consists of binding wire instead of a face guard.

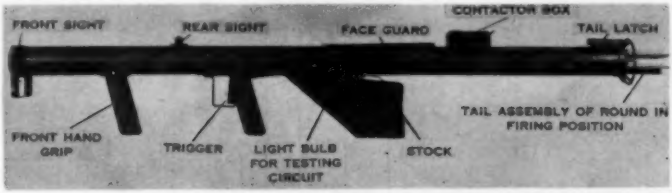


FIGURE 105.—2.36-inch Rocket Launcher, M1.

New developments in the propellant used in rockets has eliminated the necessity for a large screen-type flash deflector on the muzzle, and the necessity of the gunner wearing a mask and gloves as in the early launchers.

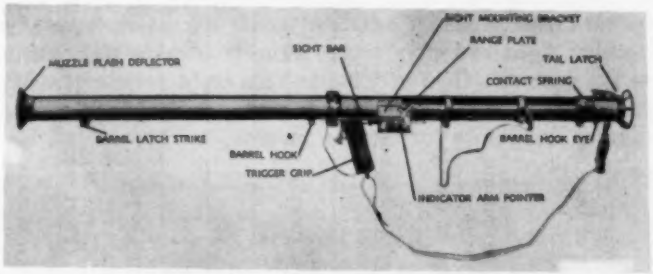


FIGURE 106.—2.36-inch Rocket Launcher, M9A1 with Folding Barrel Sight.

The newer types of rocket launchers are manufactured so that the tube can be folded into two easily assembled parts to facilitate carrying.

The electrical current necessary to ignite the rocket in the earlier models was provided by two dry-cell batteries which had to be replaced frequently and were not too satisfactory, particularly in wet weather. The recent model launchers have a magneto contained within the hand grip and the gunner generates his own current by squeezing the trigger.

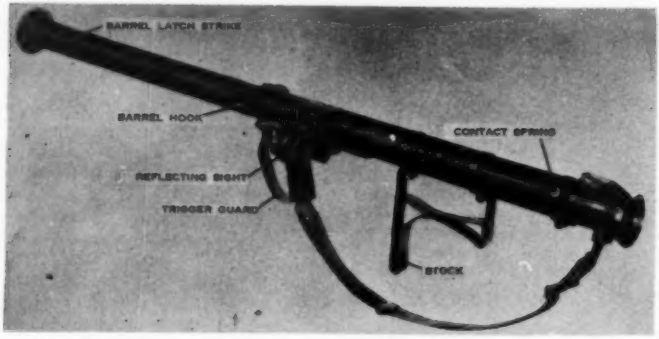


FIGURE 107.—2.36-inch Rocket Launcher, M12.

The first model launcher was aimed by sighting through a peep-sight mounted mid-way on the barrel and over one of three studs mounted near the muzzle, denoting ranges of 100, 200, and 300 yards. Leads were computed by the gunner as target leads. The latest model launchers have a reflectory sight assembly which superimposes a sight reticle on the gunner's field of vision. This sight reticle gives the gunner a point of aim for stationary targets, as well as angular lead units for moving targets.

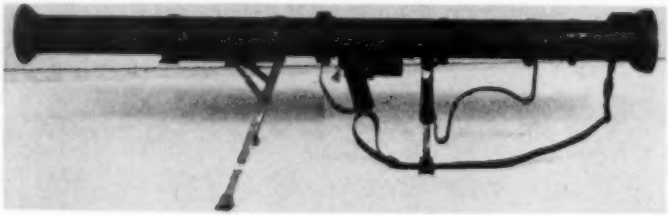


FIGURE 108.—3.5-inch Rocket Launcher.

ANTITANK GUNS AND RECOILLESS RIFLES

FIGURE 109.—37-mm Antitank Gun, M3.

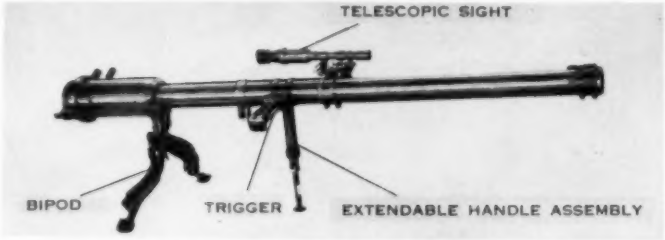


FIGURE 110.—57-mm Rifle, M18 on Bipod.

DATA	37-MM AT GUN M3	57-MM RECOILLESS RIFLE
Total weight of rifle and mount.....lbs	912	44.4
Total length of rifle and mount.....in	154½	61.6
Traverse ..... degrees	60	360
Elevation ..... degrees	+15-10	Unlimited
Method of operation (breech operated)	Manual	Manual
Type of feed	Breech loading	Breech loading
Sustained rate of fire.....rds per min	8	5
Maximum rate of fire.....rds per min	15-20	10
Maximum range .....yds	8000	4340
Maximum effective range against armor ..... yds	400-600	4340
Muzzle velocity .....fs	2700	1200
Armor Penetration .....in	1½	3½

Weight of complete round of ammunition ..... lbs	3.41	5.3
Effective radius of burst, HE.....yds	5-10	17
Recoil mechanism	Hydro-spring type	None
Primary mission	Antitank	General purpose
Number of men in crew	8	5

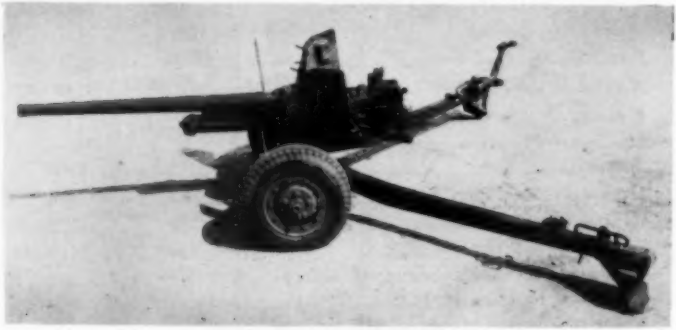


FIGURE 111.—57-mm Gun, M1.

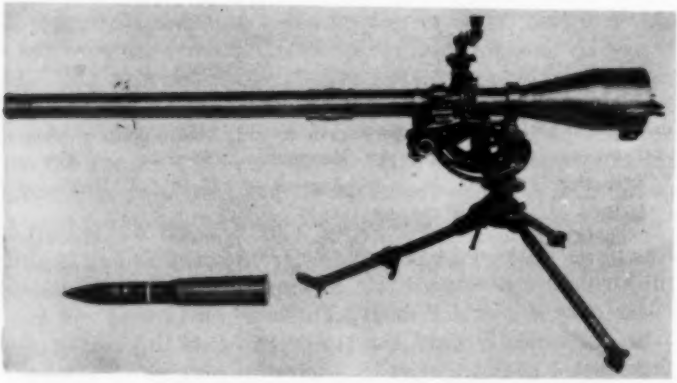


FIGURE 112.—75-mm Rifle, M20.

DATA	57-MM AT GUN M1	75-MM RECOILLESS RIFLE
Total weight of rifle and mount....lbs	2915	167.7
Total length of rifle and mount.....in	200	82
Traverse ..... deg	90	360
Elevation ..... deg	+15-5	45
Method of operation	Manual	Manual
Type of feed	Manual breech loading	Manual breech loading
Sustained rate of fire	15	7
Maximum rate of fire.....rds per min	30	12
Maximum range	12,670	7200
Maximum effective range against armor ..... yds	800	6955
Muzzle velocity (HE) .....fs	2800	990
Armor penetration ..... in	3.71 @ 500 yds	4¼ @ any range
Weight of complete round of ammunition (approximately) .....lbs	13	22.6
Effective radius of burst, HE.....yds	15	25-30
Type of recoil	Hydro-spring	None
Primary mission	Antitank	General purpose
Number of men in crew	10	*5 or 10

*NOTE: Each squad is equipped with two rifles. When the situation is stabilized the squad breaks up into two 5-man crews and operates the second weapon which is normally carried on the squad weapon carrier.

Motivated by a dire need for a light, portable-type artillery piece that could be carried by front-line infantry troops, the Ordnance developed the 57-mm and 75-mm recoilless rifles during World War II. These weapons were not produced in quantity until the later phases of the war, hence their combat value cannot be accurately determined. On the occasions where they were used in Germany and on Okinawa, commanders praised them very highly but frequently qualified their remarks by adding that the immense backblast of the weapon immediately disclosed its location.

(Similar comments were made about rocket launchers when they first appeared but these disadvantages were overlooked by combat units because of their great effectiveness.)

Comparing the recoilless rifles with the 37 and 57-mm antitank guns does not represent a true process of evolution—rather it represents a complete metamorphosis. The recoilless rifles are highly versatile all-purpose weapons possessing greater mobility and greater firepower at effective ranges. The antitank guns were, by comparison, highly immobile, uneconomical of troops, and not adaptable to missions other than antitank.

Recoilless rifles can be employed against personnel and for general defensive purposes, but primarily they are offensive weapons to be moved up with front-line elements against specific targets, tanks, strong points, troop concentrations, and pillboxes, where their striking power has proven invaluable. Not only can they be used against close in pinpoint targets, but at comparatively great ranges, with a variety of charges: high explosive, smoke, and armor piercing. With the introduction of the shaped charge penetration is the same regardless of range, whereas in the case of the conventional AT gun, the penetration was decreased as the range increased.

The present day recoilless rifles do not actually represent a new type of weapon; Commander Davis of the United States Navy developed a recoilless weapon in 1917, which simultaneously fired a projectile to the front and a mass of plaster of paris and buckshot to the rear, thus eliminating recoil. The Germans utilized an equally crude model in aircraft cannon in World War I and again in airborne artillery in World War II. Although the present weapons represent a great deal of improvement over previous types, they also have a singular inherent disadvantage which will have to be eliminated before the weapon will attain its maximum value. Thus, when a method of eliminating the tell-tale back blast is devised, the weapon will be of much more use to the infantry.

TANKS

Based on the specifications for an armored vehicle on a caterpillar system, capable of crushing wire entanglements and spanning trenches, and being heavily enough armed to permit advancing on and engaging field pieces, the first modern tank was developed and used by the British Army against the Germans on the Somme in the summer of 1916.

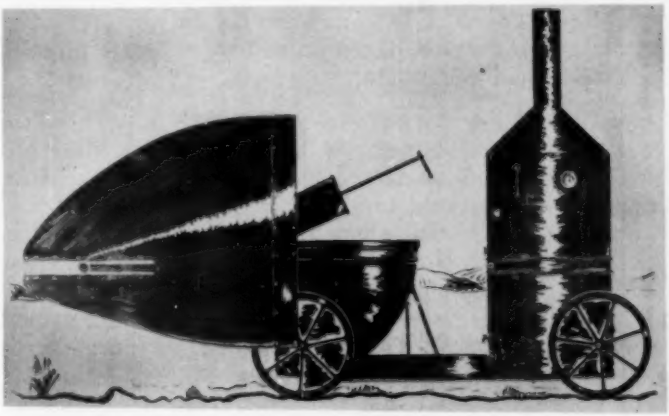


FIGURE 113.—The First U.S. Tank—Winan's Steam Battery, 1861-65.

By the termination of World War I, the United States had produced a number of French and English designed Renaults and Mark VIIIs, which were retained despite their obsolescence, for experimental and training purposes until about 1935. Tank development during the period following World War I until the later '30s was seriously impeded because of lack of funds. However, constant experimental work was carried on with the funds that were available. During the ten years following the Armistice, the United States built a total of seven tanks.

Developments in 1937 resulted in the medium tank T5, later to become important as the medium tank M2, which, with a five man crew, weighed 17½ tons. This tank powered by a 350 horsepower radial engine, was capable of making 32 miles per hour. It was armed with one 37-mm gun

DATA	TANK M3	TANK M4A1	TANK M26
Weight, fully loaded, approximately ..... tons	30	31	46
Length	18' 6"	19' 2"	26' 11"
Height	11'	9' 3"	9' 1"
Armament	1-75-mm gun M2 1-37-mm gun 4-.30 cal MG 2-.45 cal Thompson SMG.	1-75-mm gun M3 1-.50 cal HB M2 MG 2-.30 cal M1919A4 MG 5-.45 cal M3 SMG	1-90-mm gun 1-.50 cal HB M2 MG 2-.30 cal M1919A4 MG 1-.45 cal M3 SMG 1-Smoke Mortar 2-in M3
Ammunition ..... rds	50-75-mm 178-37-mm 9200-.30 cal 1300-.45 cal	97-75-mm 300-.50 cal 6250-.30 cal 600-.45 cal 12 Hand Grenades	70-90-mm 550-.50 cal 5000-.30 cal
Armor penetration ..... in	2.6	2.8	4.8 APC 7.8 HVAP
Muzzle velocity (gun) ..... fs	HE 1450 APC 1930	HE 2030 APC 2030	HE 2700 APC 2700 HVAP 3350
Maximum range (gun) ..... yds	10,650	13,300	19,560

Armor thickness ..... in	Front slope Turret Sides	2 2 1½	2 3 1½	3-4 4 3
Crew ..... men		7	5	5
Engine		Continental 9 Cylinder Radial 4 Cycle	Continental 9 Cylinder Radial 4 Cycle	Ford GAF V-8
Horsepower		400	400 @ 2400 RPM	500 @ 2600 RPM
Fuel capacity ..... gal		185	174	202
Miles per gallon ..... mi		.80	.75	.35
Crusing range ..... mi		144	85.125	65-100
Speed (Maximum allowed) ..... mph		24	24	25
Suspension		Vertical Volute	Volute spring	Torsion bar all steel
Tracks		Rubber block	Rubber/steel 16" wide	All steel 24" wide
Communication ..... intertank		Telephone	Telephone	Telephone
Communication ..... radio		Radio SCR-245	Radio SCR-508 or 528	Radio SCR-508 or 528

and eight .30 caliber machine guns. Although declared the best tank produced up to this time, it was never built in quantity and was soon outmoded by the M3 series.

FIGURE 114.—Medium Tank M2.

FIGURE 115.—Medium Tank M3.

The M3 or "Lee" was the first American tank to be armed with the 75-mm gun. Although it had a comparatively high silhouette and was hampered by limited turret traverse, it gave a good account of itself in the African desert campaigns. A model used by the British, equipped with a wider and lower turret, is known as the "Grant". One model in this series differs in that it had a cast, rounded hull, giving it a streamline appearance.

FIGURE 116.—Medium Tank M4A1.

The M4 series or "Sherman" was the standard American tank used in World War II. Most of its several models including the M4A2, M4A3, and M4A4 are almost identical in appearance and performance. Its 360° turret-mounted 75-mm gun or the 76-mm high velocity gun made it more flexible than the side mounted 75-mm gun on the M3.

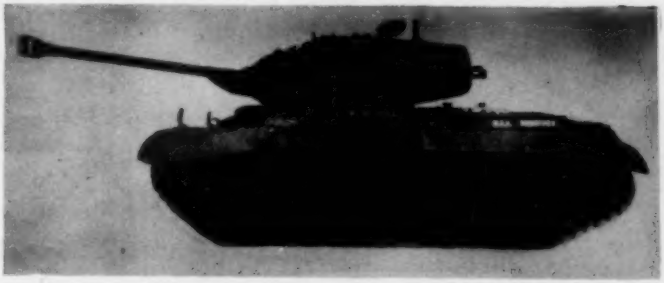


FIGURE 117.—90-mm Gun, M3 on Tank M26.

The latest model Infantry tank is the medium M26, mounting a 90-mm gun, two .30 caliber light machine guns, and one .50 caliber machine gun. The armor thickness is considerably greater than any of the M4 models, but it still possesses maneuverability and performance comparable to the M4A3 and M4A6. The suspension is a torsion bar type with wider tracks and tread compensating for the added weight of armor.

The M26, introduced during the last few months of World War II, proved to be more than a match for the famed German Tiger Royal mounting an 88-mm gun.

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